Foreword by Ken Smith

DIGITAL DRAWING for LANDSCAPE ARCHITECTURE

Contemporary Techniques and Tools for Digital Representation in Site Design

BRADLEY CANTRELL • WES MICHAELS

Digital Drawing for Landscape Architecture: Contemporary Techniques and Tools for Digital Representation in Site Design

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Foreword

It is easy these days to assume everyone knows how to use new media. One probably imagines that by now new electronic media and image making are embedded in the DNA of everyone who uses a computer, personal device, or other digital tools. But the reality is that media and image making are an art form with learned techniques and protocols. There is always need for excellent tutorials that describe basic techniques and their application and I am pleased that *Digital Drawing for Landscape Architecture* is providing for a new generation of landscape architects training in contemporary digital media and its application as an emerging art form.

I come from the generation that learned manual graphic techniques came of age using digital applications as an extension of these traditional techniques. As a student, I remember learning photography by reading manuals and silk-screening from printmaking books. Skills like collage and montage were acquired much more intuitively, and other techniques such as press-on lettering were learned on the job in an office. It is interesting to me to see how much of the old methods are built into the new digital procedures. One of my favorite Photoshop filters is *pixelate-mezzotint*. From my knowledge of printmaking, this filter makes clear sense to me. Likewise *cut* and *paste* tools are basically collage techniques, and *dry brush* and *cross hatch*, etc., are based on traditional art processes. Expanded electronic techniques go beyond mere digital adaptation of the traditional to create new graphic and design possibilities that were difficult or even impossible to achieve before. Certain kinds of geometric distortions, such as stretching, bending and inversions, are not only transforming the representation of landscape design but also design itself as new forms and spatial relationships are pioneered in digital space. Combining techniques to create non-standard representation forms has emerging potential as well. This is clearly evident in today's contemporary art world where artists are creating new art which incorporates a vast array of new media in innovative ways to challenge our way of seeing and understanding the world. Today, my office uses an array of representation techniques ranging from drawing to physical model building to digital modeling, and all sorts of combinations of digital imaging and animations, all at a range of differing scales. Ultimately, the best design still results from thinking, designing and representing with multiple scales, views and methods.

This book will become a standard manual for students entering the profession and learning their craft, as well a valuable reference for those already in practice who need to keep current with emerging trends. Just as it was impossible to practice twenty-five years ago without knowledge of ozalid printing, letraset, zipatone and rapidiograph use, today it is unimaginable to practice in a world without Photoshop, Illustrator, 3DStudioMax, Rhino, SketchUp and CAD.

—Ken Smith

Preface

Digital Drawing for Landscape Architecture: Contemporary Techniques and Tools for Digital Representation in Site Design is the product of many years of professional practice and teaching at the Louisiana State University Robert Reich School of Landscape Architecture. As designers, we attempted to create a book that focused on getting the job done. In this sense, each section tackles the basics of the subject matter and each chapter introduces a short background with an explanation of how to accomplish a phase of the representation process with current digital tools. Our inspiration comes from the books that introduced us to landscape architectural graphics, such as Grant Reid's *Landscape Graphics* and Chip Sullivan's *Drawing the Landscape*. Both books present the reader with techniques that are applicable to a specific topic with just enough background to explain how it fits within the larger profession. Our hope is that *Digital Drawing for Landscape Architecture* will serve as a contemporary, digital version of these books for landscape architecture professionals and students.

We come from a group of academics and professionals who did not take any formal digital media courses. Instead, we were taught analog mechanical drafting and drawing and then applied those skills to our interest in digital media. All of our skills come from exploration through trial and error. We learned that doing it the second or third time was always the most productive. Typically, we would jump into a project and begin to experiment. If we didn't understand a tool, we opened the Help file or just started using it to see what happened. This book outlines techniques, but we encourage you to experiment. There are an infinite number of ways to get to the same solution, and it is important that you find a way that works for you.

Digital Drawing for Landscape Architecture is a book about the moment, bridging analog and digital techniques. Digital landscape representation relies heavily on the past, and we attempt to tie past and present together. We are consistently amazed at the work our colleagues and students produce, and our hope is that by putting out defined techniques, individuals will question and evolve these practices. In the long run, landscape representation will eventually begin to leave the conventions of the mechanically drafted orthographic drawing in favor of parametric modeling and geographic information systems. While these systems exist, they currently do not address the needs of site designers as creative design tools.

It is always a risk to base any book on specific software, but when techniques are introduced it is almost impossible to be completely software agnostic. It is possible to create amazing work with any software, but we focused on the tools we use everyday: Adobe Photoshop, Adobe Illustrator, 3ds Max, SketchUp, and Vectorworks or AutoCAD. These are not the only tools, but they are the ones we have evolved with over time and, therefore, feel the most comfortable using. While software does change, it has

essentially been very consistent for the past 10 years. Features are added and refined, but the process has not been considerably altered through time. It is very easy to constantly chase the newest tools, but it is typically more productive to evolve our own processes with or in spite of the tools. You will find that most of the techniques discussed in this book will work in software versions that date back 5 to 10 years.

Digital Drawing for Landscape Architecture presents examples and techniques for each of the traditional design drawings: diagram, plan, section/elevation, and perspective. These drawings are the basis for all of our representation endeavors; and while we encourage experimentation in how these drawings evolve, it is important to recognize the need for measured drawings when working in digital media. The techniques also focus on speed and efficiency, which translates to getting a job done quickly, with the fewest mouse clicks, and being able to edit the drawing when necessary. You will find that almost every technique allows representation to be an iterative process, creating elements that we assume will be changed or modified. There is very little certainty within the design process and, therefore, it is essential that drawings remain flexible.

This book assumes that readers are versed in basic representation concepts and computing principles. The book spends a small amount of time discussing how computing affects the representation process and the basics of each piece of software, but it is not intended as an introduction to any particular piece of software. There are many great books that catalogue and explain each feature of the software. The software's Help file is a great resource to help you understand every tool and its effect. If you don't understand a concept in the Help file, use a search engine and find out more information on the Web. We are no longer working alone, and someone else may have already figured out or encountered many of the issues you will run into with the software.

This book is intended to highlight examples, explain techniques, and provide context for how we use digital media as designers. Feel free to start at the beginning or jump around to areas of interest; either method is suitable to take advantage of the information. We hope you will take away something new and contribute back to others with new and interesting techniques.

Acknowledgments

There are many people to acknowledge in the creation of this book. My wife, Susan, has been extremely supportive and her expertise as a graphic designer has contributed to my knowledge of digital media. Without my friend, colleague, and co-author Wes Michaels, this book would have never come to life. I also need to give a special thanks to my friend and the Director of the LSU Robert Reich School of Landscape Architecture, Elizabeth Mossop. My graduate assistants Patrick Michaels and Natalie Yates have made huge contributions that have made this book possible.

I must go back many years and acknowledge the genesis of this work which started during my time in graduate school as an intern for Geller DeVellis. Many of the techniques and approaches to digital media were developed alongside my colleagues Scott Carman and Chuck Lounsberry. I consistently learned new methods thanks in large part to the genius of these two individuals. Working as a team, we were able to push our boundaries and accomplish some very innovative work at the time. Joseph Geller and Bob Corning also gave me opportunities and freedoms that contributed directly to our success.

I also need to acknowledge David Fletcher and Wilson Martin who helped to develop an approach to teaching digital landscape representation that focused on tangible techniques embedded in historical precedent. This was a departure when we first taught the landscape representation module at Harvard but is the focus of this book.

Teaching for the past five years at the Louisiana State University Robert Reich School of Landscape Architecture, I have seen phenomenal changes in the way students are conceptualizing and representing their projects. This book is full of their amazing work, and I feel extremely proud to say that I had a part in teaching them. The students consistently amaze me with their hard work and the design work they produce. While I can't name everyone, I would like to specifically acknowledge the following digital (and analog) media gurus: Chris Africh, Natalie Yates, Christopher Hall, Patrick Michaels, Jamin Pablo, Ying Lou, Xiaoyang Zhao, Joaquin Martinez, Paul Toenjes, Andrea Galinski, Louise Cheetham, Megan Colwart, Zhujun Wang, and of course the dream team: Bob Bass, Chris Barnes, and Conners Ladner. There are many more doing amazing work that I am sure I am forgetting.

Much appreciation goes to our editor Margaret Cummins, who has worked with us through this process.

Brad Cantrell

Many of the ideas found in this book have their origins in a course I first taught several years ago at LSU, and continue to teach to this day. That course, and this book, evolved through many hours of conversation with the co-author of this book, Brad Cantrell. The techniques were refined through many hours of experimentation with Brad while working on design competitions and research grants at the university. Similar to Brad's experience, the ideas and techniques I have contributed to this project are based on my experience in professional offices working on projects with deadlines. In my office today, we use the digital workflow concepts and techniques described in this book. I would like to thank the incredibly talented Jessica Pfeffer for all of her hard work on the projects from my office. Jessica's hand is seen throughout, and I give credit to her for the beautiful work on so many of the images in the book.

Many of the same people that Brad has acknowledged above are some of the same people that I have worked with at LSU. I won't rename each one, but will say a special thanks to Elizabeth Mossop for her support as Director of the school and our editor Margaret Cummins for her patience and good humor over the many long months this book was being put together.

Finally, I would like to thank Anne for her support while I spent evenings and weekends writing this book. Without her encouragement and understanding, this book would have never made it through to the end.

Wes Michaels

Part 1
Concepts

Chapter 1
Introduction/Overview

Digital Drawing for Landscape Architecture: Contemporary Techniques and Tools for Digital Representation in Site Design provides professionals and students with a clear guide to understanding the digital representation process for a variety of design drawings. Each chapter highlights a specific technique by examining its role in the digital media and landscape representation process through methods available in current software. This provides the reader with tangible tools to explore digital media in the creation of design drawings.

The professions of landscape architecture and urban planning have a strong tradition of representation that has evolved with the professions. During the last hundred years, this has been dominated by analog representation—primarily pencil (graphite), pen (ink), markers (pigment), and watercolor (pigment). The aforementioned analog representation techniques have focused on creating a variety of design drawings such as functional and operational diagrams, orthographic plans, section/elevations, isometrics, and perspective renderings.

The content in this book intends to bridge a fundamental gap between the analog and digital tools used to represent landscape architecture and urban planning projects. The gap has formed in representation methods with the introduction of digital tools that have been adopted despite a generation of designers who are versed in analog methods. *Digital Drawing for Landscape Architecture: Contemporary Techniques and Tools for Digital Representation in Site Design* aims to fill this gap by pulling from the methods of analog representation and applying these concepts to digital media. Examining individual working methods and applying the content of this book to enhance the current design and representation processes are essential to this goal.

A misnomer that many designers intend to embrace when moving to digital representation methods is that the past can be left behind; nothing could be further from the truth. Knowledge of analog representation plays a vital role in understanding the application of digital tools and techniques. Tools such as Adobe Illustrator and Photoshop are born directly from analog processes and tools defined by their physical counterparts. The Paint Bucket tool is used to pour paint into areas, and the PaintBrush tool applies paint to a virtual canvas. This language is intentional and builds on our current knowledge of illustration, avoiding the creation of a new digital tool that has no context in the physical world. It would be confusing and the learning curve would be that much steeper if the Photoshop Paint Brush tool was called the Pixel Application tool and the canvas was called the pixel grid.

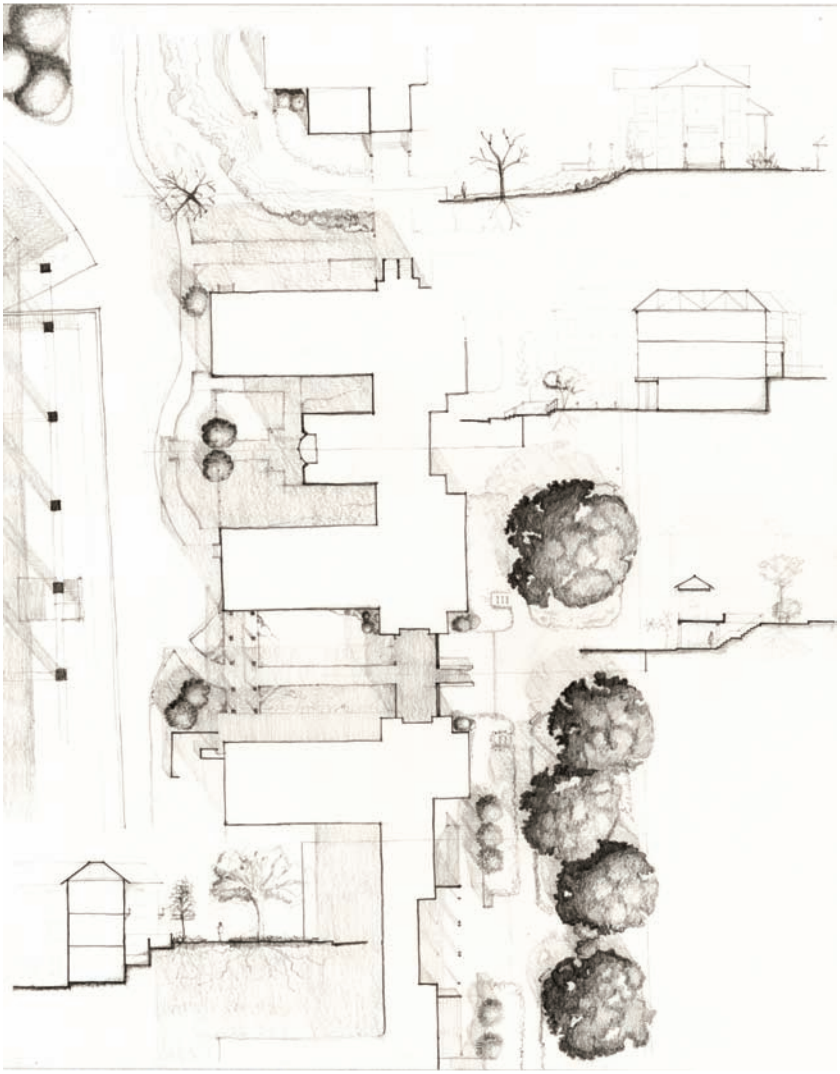


Figure 1.1. Graphite, walking plan.

The connections between analog and digital modes go beyond naming conventions into techniques and processes. Current digital rendering processes vary greatly between individuals and firms, as well as across a range of software. It is commonly said that there are an infinite variety of ways to accomplish the same task in image- or vector-editing software. The versatility of most software packages comes from the variety of tools and the options for combining those tools to complete a specific task. This versatility allows the software to be used across a variety of professions from photography to technical illustration. Because of the depth and versatility of the software, the learning curve is typically steep for new users. Similar to using a pencil and pen, there is no way to automatically generate a section, plan, or elevation. Instead, a combination

of tools and methods come together through a proven process to generate the desired results. Digital media provides efficiencies in some areas but does not provide a shortcut to learning the fundamentals of drawing and illustration.

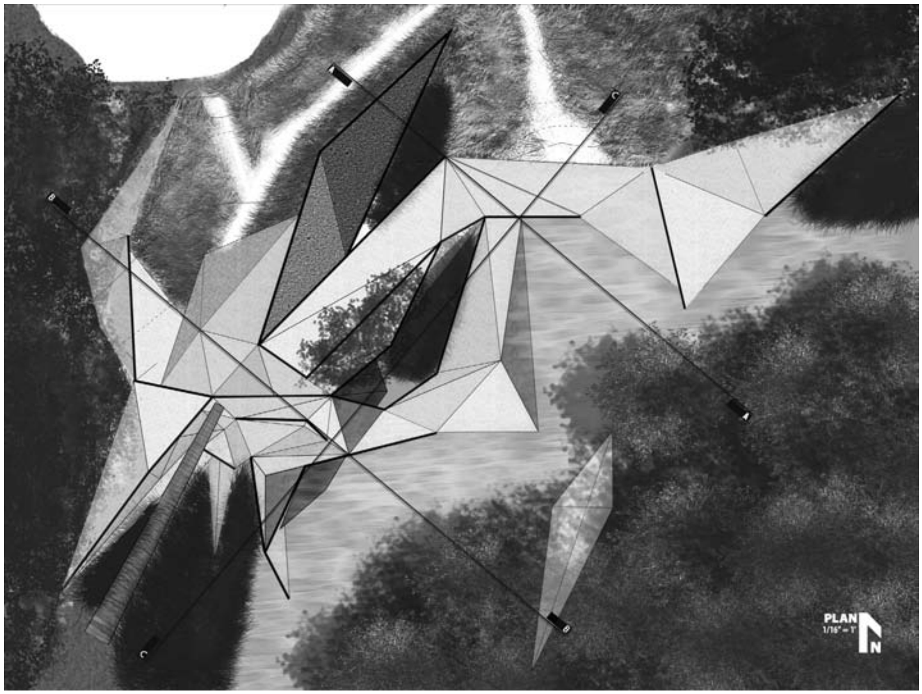


Figure 1.2. AutoCAD and Photoshop, Bayou Bienvenue site plan.

Understanding the fundamentals of drawing is essential, but it is not exclusive to either medium. The contemporary design world fully embraces both mediums as valid methods to represent projects and explore design ideas. It is possible to understand the fundamentals of composition, lineweight, texture, color, and/or atmosphere with a pencil or with Photoshop. The physical processes may be different, but conceptually the rules and ideas are similar.

Conceptually, each designer must embrace digital media as a tool with analytic, performative, and representational possibilities. Many designers view the computer as a rival that must be conquered in order to accomplish each task. It is important to reverse that role. In order to do this, the designer should have a general understanding of how a computer and operating system function. This environment of hardware and software is where most processes occur; therefore, taking the time to become familiar with your surroundings is very useful. Typically, this is a low priority for designers; we are not computer engineers and, therefore, we often overlook or even overcomplicate basic hardware and software functions.

Figure 1.3. Illustrator and Photoshop, ambient space section-elevation.

Computing Basics

Understanding the basic components of computing and how they affect the design and representation process is necessary. The relationships between hardware and software and the operating system and applications are important to understand in order efficiently utilize the tools. Understanding this relationship demystifies computing processes that are not readily apparent to the end user. Typically, the hardware, operating system, and applications attempt to hide as much of the computing processes as possible from the end user, but there are times when it is necessary to know enough in order to troubleshoot simple problems.

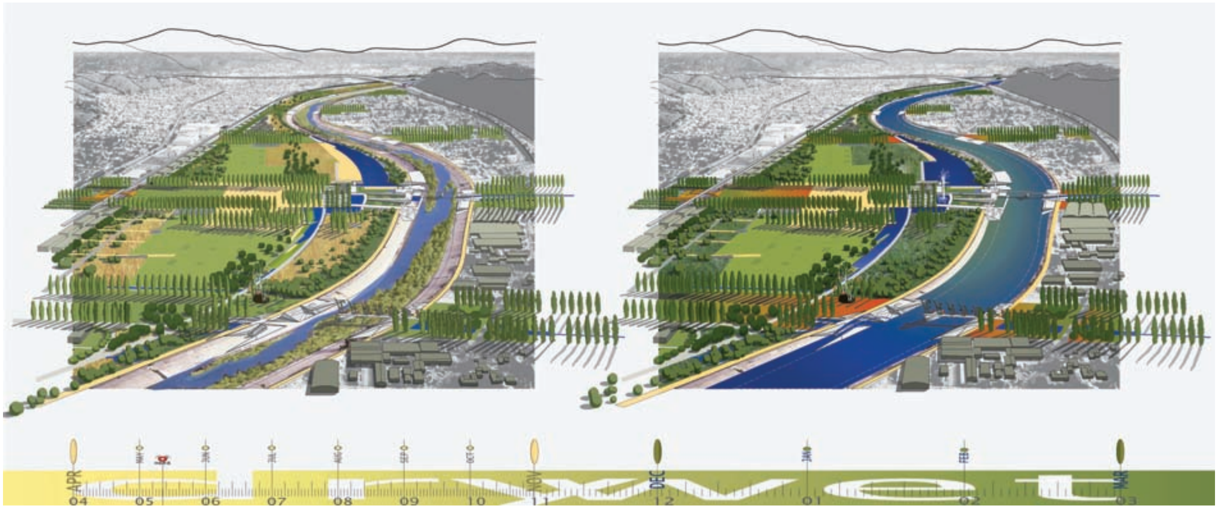


Figure 1.4. Adobe Illustrator, Taylor Yards seasonal-change aerial perspectives.

Hardware

Laptop and desktop computers typically have a motherboard, a processor, memory, a hard drive, a network connection (wired and/or wireless), and a graphics card. These components provide the necessary functions to do most of the tasks we consider necessary in contemporary computing. From this base, we can begin to add components such as a keyboard, mouse, and monitor in order to have a fully functioning machine. There is little difference between a desktop and laptop computer other than the fact that the keyboard, mouse, and monitor are integrated on a laptop. Because laptop components are usually much smaller and are custom built for each brand, upgrading them can be much more difficult than upgrading desktops. For example, processors are usually not upgradeable components in laptops because they may be soldered directly to the motherboard.

Motherboard

The main component of computers that we rarely discuss is the motherboard. The motherboard is the framework for the entire machine, but unless we are building the computer ourselves, it is not an extremely important consideration. The motherboard provides connections for the processor, memory, storage, graphics cards, and expansion slots, which would contain the graphics card and other components. Many motherboards will integrate graphics, network, and sound functionality directly into the motherboard. Integrated solutions often provide less functionality and performance; however, in the case of network and sound, this typically is not a problem for designers who rely on the computer to create visual products. At the time of this writing, integrated graphics cards should be avoided; they perform poorly when used for

illustration and three-dimensional modeling, and they are not upgradeable when new graphics cards are introduced.

Processor

The processor or CPU (central processing unit) can be thought of as the brain of any computer. The CPU is attached to the motherboard in the CPU socket and is dependent on the *chipset* (technologies that constitute the motherboard). Because of the complexity of CPUs, there are very few manufacturers in the commercial computing market. Nearly all computer manufacturers (Dell, HP, Apple, etc.) use either Intel or AMD processors that use the x86 instruction set. Two important factors need to be addressed regarding the CPU: 32-bit and 64-bit addressing and processing speed. Most CPUs at this time are moving toward 64-bit addressing, which is very important for visual artists because it allows the computer to more efficiently execute instructions and address larger amounts of memory. In the past, 32-bit CPUs could only address less than 4GB of memory; however, with the introduction of 64-bit processors, it is theoretically possible to address 16.8 million terabytes of memory. In order to utilize a 64-bit processor, it must have an operating system and software that is coded to take advantage of the 64-bit instruction set.

The second important concept to understand is the speed of processor, which is typically measured in gigahertz. If everything else is equal with a computer, the faster the speed of the processor, the more instructions it can complete in a given time (milliseconds). Many factors, such as memory and hard drive speed, can change this general rule. However, it can generally be assumed that the faster the processor, the faster the computer will complete operations. This affects us directly in the representation process as we apply procedures and effects that require the computer to do large calculations. An example would be the application of a filter in Photoshop; when the filter is applied, the computer must calculate the effect on the image, and a faster processor will typically take less time to accomplish this task.

It is also possible to use multiple processors in some desktop/workstation configurations in order to provide more processing power. In most instances, dual processors provide more efficiency in multitasking rather than doubling the processing power. In essence, this allows a filter to be calculated while switching to another program to accomplish a secondary task without as much of an overall slowdown in the computer. Most of the current processors also use multiple cores, dual cores, and quad cores, which can be thought of as multiple processors embedded within a single processor. This provides greater multitasking possibilities, and software is currently being written with multiple cores in mind in order to take advantage of these efficiencies.

Memory/RAM

To use another analogy, memory or *RAM* (random access memory) can be thought of as short-term memory. Information that is currently being accessed is stored in the computer's RAM, which allows the information to be accessed very quickly. The major

benefits of RAM are its speed and the fact that data can retrieved from any location in the memory rather than being retrieved sequentially. This is why the term random access memory is used. RAM is a *volatile* storage medium, which means that when the power is turned off information is lost. If possible, it is desirable to load information into RAM and to complete all of the operations within the computer's RAM without having to offload data to the hard drive. Anytime the computer goes beyond the computer's current RAM, operations slow down as the hard drive is accessed to swap out information.

As mentioned previously, there are certain limitations in computer architecture where 32-bit systems and software can only access memory configurations that are less than 4GB. Currently, most hardware and software is moving toward 64-bit and can access much larger quantities of RAM. A desktop machine should have between 4GB and 8GB of RAM, while laptops typically max out at 4GB—although some workstation replacement laptops are moving to 8GB configurations. Typically, more RAM is better. If the computer, operating system, and software are all 64-bit compatible and if it is affordable, most systems will benefit from up to 8GB of RAM when working with large images or data sets.

Hard Drives

Another type of memory is the mass storage device, which is usually referred to as the hard drive. A hard drive provides a storage medium that is slower than RAM but capable of storing much larger amounts of information. The hard drive typically stores between 300 gigabytes to 1,000 gigabytes (a terabyte) of data with larger sizes on the horizon. The hard drive is a nonvolatile storage medium; therefore, when the power is turned off, the information is retained. This is why almost everything needed to make a computer function is stored on the hard drive, including the operating system, applications, and all of the user data such as documents, images, videos, and music.

Hard drives operate at different speeds that are measured in revolutions per minute (RPM), which are typically 5,400, 7,200, and 10,000RPM. A faster hard drive will optimize the system's bootup speed, allow applications to load faster, and speed up the opening of files. Currently, 10,000RPM hard drives are prohibitively expensive for very large drives and a common configuration is to use a 10,000RPM drive for the system, applications, and current projects, and another drive as a data archive. In many offices, this second drive is not a concern because most project data is stored on a centralized server; therefore, the bottleneck is often the speed of the network and the number of users accessing the data. The hard drive is often contained within the computer, but it is also possible to use external enclosures that contain a hard drive. This allows data to be more portable and not tied to a specific computer.

Graphics Cards

Graphics cards provide a secondary processor that specializes in two- and three-dimensional graphics calculations. Current versions of Photoshop take advantage of the

graphics card to display images in both two and three dimensions. True three-dimensional applications depend on the video card to display three-dimensional data on the screen in real time. Graphics cards have three components to be concerned with: the speed of the GPU (graphical processing unit), compatibility with OpenGL or DirectX, and the amount of memory on the card.

Generally speaking, the faster the speed of the GPU, the more graphical operations the card can perform per second. This translates to faster panning and zooming in Photoshop, as well as smoother orbiting, panning, and zooming in Google SketchUp, 3ds Max, and Maya. Upgrading the graphics card is usually possible in most desktop computers; however, this typically is not possible in laptops.

Monitor

Beyond using these basic components, there are many ways to extend the functions of a computer through peripheral devices that can be categorized as providing an input or output. The most important output peripheral is the computer monitor or display. Displays come in a range of sizes from 13″ laptop screens to 30″ high-resolution desktop monitors. Most monitors use LCD (liquid crystal display) technology with either fluorescent or LED (light emitting diode) backlighting, with LED backlighting consuming the least power and having more even brightness. There are other technologies for computer displays, but the LCD is by far the most common in both laptops and desktops.

The most important thing to consider for LCD monitors is their native resolution, which is the number of pixels that they can display both horizontally and vertically. *Native resolution* is the resolution at which the display is designed to function. It will typically be between 1024 × 768 and 2560 × 1600 pixels. This resolution is the actual number of pixels that are displayed across the surface of the monitor. Smaller monitors typically display fewer pixels, and larger monitors display more. When a designer is working with high-resolution images, it is useful to have larger monitors in order to see more of the image at its actual size at once. Larger high-resolution screens also make it more convenient to have multiple applications open at once because they will be able to fit on one screen. If the graphics card supports multiple monitors, it is possible in both Windows and OS X to use two or more monitors in order to span the desktop across the screens. This can be very useful and is often an affordable and more versatile solution to having one extremely large monitor.

The second most important factor is the actual size of the monitor. For laptop computers, the monitor is based on the size of the computer. However, most laptops provide either a VGA (analog) or DVI (digital) port in order to connect an external display. The monitor's size is measured diagonally across the surface of the monitor, so a 24″ desktop monitor measures two feet from the upper-left corner to the lower-right corner. Most LCD monitors have a 16:10 widescreen *aspect ratio,* which is the ratio of horizontal to vertical pixels. Beyond size and resolution, some monitors provide other input options

that allow video devices to be connected or even act as an input hub for USB and/or FireWire devices.

Input

Two often overlooked devices are the mouse and the keyboard. They are typically boring, and every computer has them. However, the keyboard and mouse are important and should be comfortable and fully functioning because they are the primary methods of interaction with a computer. Nothing will slow down a designer more quickly than a sticky keyboard or a mouse that does not smoothly track across the screen. Each user will have their own preference when choosing a keyboard or mouse, but generally the keys should provide tactile feedback and the mouse should have enough weight to provide smooth tracking on the screen. In most operating systems, the speed of tracking, double-clicking, and other features can be adjusted in the Control Panel (Windows) or the System Preferences (OS X). These settings need to provide the most comfortable and efficient experience for each user.

Beyond the keyboard and mouse, several other haptic devices expand the ways in which we interact with a computer. Pen tablets provide a decent tool to naturally sketch or draw within most image-editing applications. The main benefit of this type of input device is that it gives the user the ability to draw naturally and have multiple levels of input. This allows the user to press softly for one effect and harder for another effect. In Photoshop, for example, the pen pressure can be mapped to the number of pixels that are applied or even how far away the pixels scatter from the area they are being applied. The main drawback with using a tablet is that it requires some time to become comfortable with the device. Another drawback is that if it is not used every day, it can be hard to jump right back into using it.

Spatial navigation devices are also worth discussing. These haptic input devices provide an alternative two-dimensional (2D) or three-dimensional (3D) axis that allows for navigation across the picture plan in Photoshop or for moving with a SketchUp or 3ds Max scene. The typical configuration is a puck or joystick that can be used in configuration with a keyboard and mouse that can be pushed forward and backward, or pulled upward or pushed down to control movement along each axis. Most devices also provide hotkeys to map frequently used functions.

Other input devices include cameras and scanners that can be used to capture a variety of images for use in digital rendering. Digital photography is the subject of an entire book, but it is important to consider some very basic concepts. Digital cameras are the best method to record the environment around us, capturing images of textures, people, plants, materials, etc. It is useful to build a versatile collection of imagery that is well organized and easily accessible for use in renderings. Cameras capture images at resolutions measured in millions of pixels or megapixels. The more megapixels a camera can capture, the higher the resolution of the image and, therefore, the larger the output when printing occurs. Megapixels are only one factor when determining the

quality of the final image; it is also important to consider lighting, stability of the camera, focus, and shutter speed.

Desktop and wide-format scanners are the best method to capture printed media, sketches, and other flat materials. Scanning can capture images as black and white, grayscale, or full color at multiple resolutions, depending on the scanner's ability. Black-and-white scanning captures images without differentiation or shading, and it is the most useful for clip art or pen-and-ink drawings. Grayscale will capture 256 shades of gray and is most often used to capture graphite or charcoal sketches, but it can also be used for line drawings to more accurately reflect changes in lineweight and tone. Full-color scanning should be used when scanning images or materials where color is necessary. The resolution or *dots per inch* (dpi) must be considered when scanning. If the scanned image will be used at the same size in the final output, then the scan can be done at the final output resolution. For example, an 11″ × 17″ sketch that will be touched up in Photoshop and reprinted at 11″ × 17″ can be scanned at 200 dpi and then be reprinted at 200 dpi. If the image needs to be larger in the final output, then it is possible to scan the 11″ × 17″ sheet at 400 dpi and then reprint the sheet at 22″ × 34″ at 200 dpi. It is possible to always scan at very high resolutions and in full color in order to have an image that is versatile in many situations. The only problem with this method is that it will take longer to scan and will create larger images that take up more hard drive space and are slower to process.

Software

Software typically describes code or computer programs that perform a specific task within a computer system. Although there are many types of software, designers are typically concerned with specific types of applications for pixel/raster editing, vector editing, three-dimensional modeling, and video/motion graphics editing. Each type of application plays a different role in the representation process but also interacts with and utilizes the hardware in different ways. Beyond applications, it is also important to understand the role of the operating system because it is at the core of any hardware/software relationship.

Operating System

The operating system handles the intricacies of the interaction between the user and the hardware. Generally, nearly all of the computing devices we use from desktop computers to video game consoles use some type of operating system that we interact with using a graphical user interface (GUI). The two prominent operating systems for design professionals are Microsoft Windows and Apple OS X. For architects and landscape architects, Windows has traditionally been the dominant operating system because Autodesk AutoCAD runs exclusively in Windows. This is slowly changing as compatibility increases. Many offices work in either operating system and exchange information between them seamlessly.

OS X and Windows are different types of operating systems created by the companies Apple and Microsoft, respectively. OS X will only run on Apple hardware (laptops and workstations), but Windows will run on any compatible hardware including Apple hardware. This makes it possible to use Apple hardware to boot into either OS X or Windows when necessary. This method is accomplished by creating two separate partitions on the computer's hard drive and then choosing which system to boot into when restarting the computer. Either OS X or Windows must be chosen while booting up the computer; it is not possible to work in both systems simultaneously.

Another method for running an operating system is *virtualization,* which creates "virtual" hardware on which the operating system then runs. This allows an operating system such as OS X to host or virtualize an operating system such as Windows, which means both can run simultaneously and have access to similar resources. This is an ideal working situation, but it falls short on performance—specifically when using resource-intensive applications such as Photoshop or AutoCAD. Virtualization works best when using applications for word processing or project management, or when accessing the Windows partition in order to do quick edits in CAD.

Applications

Applications represent a broad range of software created to accomplish specific tasks such as word processing, image editing, or financial management. When considering the representation of design drawings, typically we will use a range of applications to edit photos, create CAD linework, and build virtual models. Excluding applications for programming and word processing, the main types of applications designers will use are image editors (Photoshop, GIMP), vector editors (CAD, Illustrator), three-dimensional modelers (3ds Max, Maya, Blender), and video/motion graphics editors (Final Cut, Premiere, After Effects). Using each application, it is possible to find crossover or even repetition between the functions of one piece of software and another. For example, Photoshop and Illustrator share many of the same vector-editing tools to control pen paths. This crossover makes it easy to attempt to use one piece of software to accomplish everything, but it is important to understand the strengths and weaknesses of each application in order to efficiently use both pieces of software.

Image Editing

Image-editing software refers to a broad range of applications that are used to manipulate pixels for tasks such as adjusting photographs, editing illustrations, and/or altering image sizes. Pixel-based imagery is also referred to as *raster images.* Image-editing applications typically use three paradigms that are specifically useful for design representation: layers, selections, and brushes. Methods that combine these three types of tools can typically perform all of the tasks necessary to manipulate pixels. Layers are used to organize pixels in order to edit specific pixels separately from other pixels, overlay pixels on top of one another, or apply effects or adjustments to specific layers.

Selections are used to select pixels on layers or multiple layers and can range from simple shapes, such as a square or circle, to complex shapes with multiple selection percentages per pixel. Selections can be made based on shape, the color or value of pixels, vector paths, and/or existing pixels on layers. A selection typically works as a range represented by a range of grays from unselected (0, black) to fully selected (255, white). This creates a selection using 256 values, so that edits or effects can be applied as a ramp or gradient. If an area is selected, it is possible to then edit those pixels. This creates an area in which to apply the edits based on the values in the selection. For example, if an image had a rectangular selection that was fully selected, then filling it with red would create a red rectangle. If the selection were rectangular but went from fully selected on the left to unselected on the right, then filling that rectangle would create a red box that slowly faded away from left to right.

Brushes are the third component that is typical in most image-editing applications, and they are used to apply or erase pixels. Brushes consist of a brush-tip shape and controls for the dynamics of how the tip creates a stroke. This allows brushes to carefully mimic real-world brushes or create all new brushes for specific needs. Brushes can apply a single color, a range of colors, or a pattern; they even transfer pixels from one side of an image to another. All of these tasks, either applying or erasing pixels, are accomplished with a selected brush, giving the artist many options to adjust the desired effect.

Vector Editing

Vector-editing software refers to the use of points, lines, and shapes in order to represent imagery. To accomplish this, mathematical equations are used to represent the location of points, the direction of lines, and the fill-in to create shapes. There are two main types of vector-editing software for designers: illustration software such as Adobe Illustrator and drafting software such as Autodesk AutoCAD. The main difference between these types of software is that CAD applications focus on precision, and illustration applications focus on effects and appearance. In both types of vector-editing application, the tools and results are slowly becoming more congruent, as AutoCAD provides more tools to adjust style and appearance and Illustrator has third-party applications that increase the range of drafting tools.

The tools for vector-editing focus on selection, transformation, and stroke/fill manipulation. Selections are typically accomplished in three scales in vector-editing applications: multiple objects, single objects, or subobjects. A single object is typically defined as a series of points, lines, and fills that create an object such as a rectangle (four points, four strokes, and a fill). It is possible then to select a group of rectangles, the rectangle itself, or a single point or line. Once an object or subobject has been selected, it is then possible to transform the element with typical transformations such as move, rotate, or scale. Depending on the application, it may be possible to perform many other types of transformations with a variety of tools. Transformations can typically be applied interactively or by entering values for more precision.

Three-Dimensional Modeling

Similar to vector-editing applications, three-dimensional modeling applications create wireframe representations of objects using points (vertices), edges, curves, and triangles. The most common type of three-dimensional modeling is polygon modeling, which creates representations of a model through a shell or surface. Other types of modeling include solid modeling, which creates accurate representations of an object's volume and is typically used in medical or engineering simulations. NURBS modeling, or nonuniform rational B-spline, creates surfaces from curves, creating precise freeform models. A fourth type of modeling is called subdivision modeling, which is similar to polygon modeling but uses a series of refinements on the initial mesh in order to create a smooth object. In most applications, each modeling type can be converted from more complex models, NURBS, and subdivisions to simpler polygon models.

Three-dimensional models are viewed in two ways: *real time* (allowing a user to move around the world interactively) and *rendered* (creating an image or animation with preselected lighting, materials, and movements). Real-time viewing typically occurs within the application viewport as the model is created or edited. It is also possible to create real-time models that can be explored in third-party viewers or applications and perform similar to first-person video games. Real-time viewing is ideal, but it is limited by the power of a computer's graphics card. In most cases, the graphics card cannot render the model, materials, and lighting at cinematic quality, which requires drawing 30 to 40 frames every second. A rendered view or animation is created from a three-dimensional scene after the models are built, materials are applied, and the animation is planned. The computer will then calculate the complex interaction between the light and objects with the ability to create extremely complex imagery. The user can choose to render a single image or a series of images in order to create an animation.

Video Editing and Motion Graphics

Animations and movies require applications specifically suited to sequencing, modifying, and compositing a series of inline images. Two types of applications are specifically suited for this task: video-editing software such as Adobe Premiere or Apple Final Cut Pro, and motion-graphics software such as Adobe After Effects or Apple Motion. Both types of software have specific uses, but there are many overlaps between them. Video-editing software excels at placing clips and sound within a timeline in order to edit sequences and create transitions. There is a huge range of video-editing software from high-end professional packages such as the aforementioned Final Cut Pro to entry-level applications such as Apple iMovie or Windows Movie Maker. Many tasks can be accomplished in the entry-level software, but the output and refining process will be extremely limited.

Motion-graphics software excels at compositing or layering multiple images and movie clips within a timeline. Software such as After Effects can do basic movie-clip

sequencing, but the tools are typically limited compared to the professional video-editing software. Motion-graphics software uses layers and keyframing to animate layers of film, allowing the user to separate areas with masking. Most motion-graphics applications use a three-dimensional environment that makes it possible to build simple geometry with planes that can contain other movies or images. This creates a diorama-like environment that can be used to create film sets, special effects, or even complex animated diagrams.

Workspace

The space that we create for ourselves when creating drawings is particularly important for designers. This is no different when we are working with digital media. The most important aspects of any workspace are efficiency and comfort. When working with digital media, we need to consider two workspaces: the physical as well as the virtual environment. There is no formula for what a workspace should be because it differs greatly for each individual. Some users prefer a space devoid of distractions, while others relish multiple activities occurring around them. Both types of spaces can provide creative inspiration for different individuals. Because we spend many hours working on drawings, the physical space we occupy must be comfortable for us as individuals. The space should provide room for a computer and all of the peripherals, as well as space for other design explorations such as drawing and modeling.

The computing environment consists of the operating system and application interface, as well as the input devices used to control them. Typically, the input devices will be a keyboard to enter commands and a mouse to interact with elements of the user interface or drawing. The best way to use this combination of devices is to keep one hand on the mouse and the other hand on the keyboard. Maintaining a consistent relationship between the position of the hands and the input devices allows the individual to quickly select hotkeys on the keyboard while maintaining the position of the cursor on the screen. This will allow an individual to look at the keyboard very little and maintain their focus on the screen in order to see feedback from the application.

When working in any application, the user will need to perform many repetitive tasks; therefore, it is important to minimize the amount of effort required to perform each task. If instantiating a command to draw a line requires the mouse to move up to a toolbar in order to select the Line tool, the designer will waste a good portion of their time simply moving the mouse away from the drawing area. If the designer needs to pick up a drafting pencil, draw a line, put down the pencil at the top of the drafting table, and then pick up the same pencil again in order to draw the next line, the extra step of putting down and picking up the pencil will add hours to the drafting time. However, this is what many users do when they use the applications, constantly clicking a button to draw a line.

The easiest way to speed up repetitive tasks is to use hotkeys or key combinations in order to instantiate commands. In an application like AutoCAD, every command can

be entered through the command line. In Photoshop, hotkeys exist for nearly every tool and menu item. It is possible to also create custom hotkeys for most applications, but depending on the working environment, it is advisable to use the defaults as much as possible. Using the defaults makes it much easier to use another computer that may not have the same hotkey customization. Depending on the user, it may be helpful to create a quick reference card in order to quickly see the default hotkeys for the application they are using. In most applications, the hotkeys will also be visible within the menus and as tooltips when the mouse rolls over a button. All designers should make it a priority to learn the hotkeys in order to efficiently use the application they are currently using.

Most applications are used for a range of design purposes. For example, Photoshop can be used to render a plan or adjust photographs. This means that there is a huge range of tools for many different purposes, and the interface can often get cluttered and hard to navigate. It is advisable to only turn on or display the features that are necessary in order to minimize the onscreen clutter. This will also give more space to the drawing area than to tools, palettes, and dialog boxes. It would be silly to put every pencil, marker, and paintbrush on the workdesk, and the same holds true in a virtual workspace. Open and display only the tools necessary to accomplish the job at hand. Depending on the application, it is usually possible to save multiple user interface configurations that can be customized for different tasks.

It is important to understand that specific hardware and software are not necessary to create beautiful digital drawings. Amazing work has been created by the humblest of applications and hardware, while thoughtless, poorly crafted work can just as easily come from the best applications running on a high-end workstation. The goal for designers is to find a combination of hardware and software that functions reliably and comfortably for a specific design environment and user.

Chapter 2
Analog and Digital Rendering Comparisons

It can be argued that analog rendering and sketching is quicker and more natural than using digital media. The lack of a "natural" feeling is specifically attributed to the hardware and software that mediates our ability to directly manipulate the drawing surface and/or media using our hands. The main advantage of digital media is its editability and efficiency, but these are things that must be considered during all phases of the representation process. A drawing created digitally is no more editable or efficient than an analog drawing unless the tools are used correctly. This requires the designer to use a process that is both systematic and natural. It is important to define what is meant by the terms editability and efficiency.

Efficiency and Editability

Editability refers to the ability to alter, change, or update various aspects of a drawing in order to maintain flexibility as the design process progresses. Typically, a drawing that is completely editable will be a larger file in terms of data, therefore taking up more hard drive space, and will be slower to work with during the representation process. It is important to find a middle ground where the image maintains enough flexibility in both editability options, element organization, and file size. Each designer will have their own method of organization to enhance editability, and often times this will change for each phase of a project. For example, on a large site plan the shading and texturing that represents the roadways may be grouped as layers and exported (to be retrieved later when needed), allowing that portion to be flattened into a single image. This minimizes the overhead as hundreds of street trees and vegetation are placed throughout the rendering. It is not necessary to have access to all of the shading at this phase of the process, so there is no need to have those layers or effects available.

Efficiency can be enhanced in several ways: automation, portability, replication, and transformation. Digital media, based in computing, creates a paradigm that embraces the reuse of drawings and symbols through scaling, rotating, and effects. Most repetitive tasks can be automated when working with digital media. An easily understandable example of this is the resizing of images for a PowerPoint presentation. In most cases, large images should be resized in order to optimize the presentation. This can be

accomplished using **File > Scripts > Image processor** in order to automate the resizing of the vertical or horizontal pixel dimension for each image. This task would take a very long time and would be maddeningly boring if done manually, but luckily we can hand that task to the hardware and software.

Figure 2.1. The ability to maintain and edit layers adds to the flexibility and editability of digital drawings.

Portability addresses the ability of drawings to be translated across software packages and presentation formats. This is a huge advantage of digital media, but a few things must be considered before a drawing is started in order to make it as flexible as possible. When working with raster images, they should be created at the highest resolution necessary, because it is always possible to make an image smaller, but it is more difficult and sometimes impossible to make an image larger. It is also important to think about the overall color and aesthetics of the drawings in advance in order to create a cohesive series of drawings. This includes lineweights, fonts, symbols, and color palettes that are similar between drawings in order to create a comprehensive package that can be used as a set or individually.

Replication and transformation are two other important paradigms in digital media that must be embraced in order to fully take advantage of the software. The idea that symbols, textures, and layers can be easily replicated and altered is a huge departure from analog media. Cutting, copying, and pasting happen with relative ease using digital media, which becomes apparent in renderings unless steps are taken to transform and edit the copies. When a copy is created using analog media either through transfers or tracing, there are typically small differences in each copy—whereas with digital media, each copy is an exact copy. Small changes in transforms (rotating, scaling), color, and masking can add enough change that each copy won't appear to be exact duplicates.

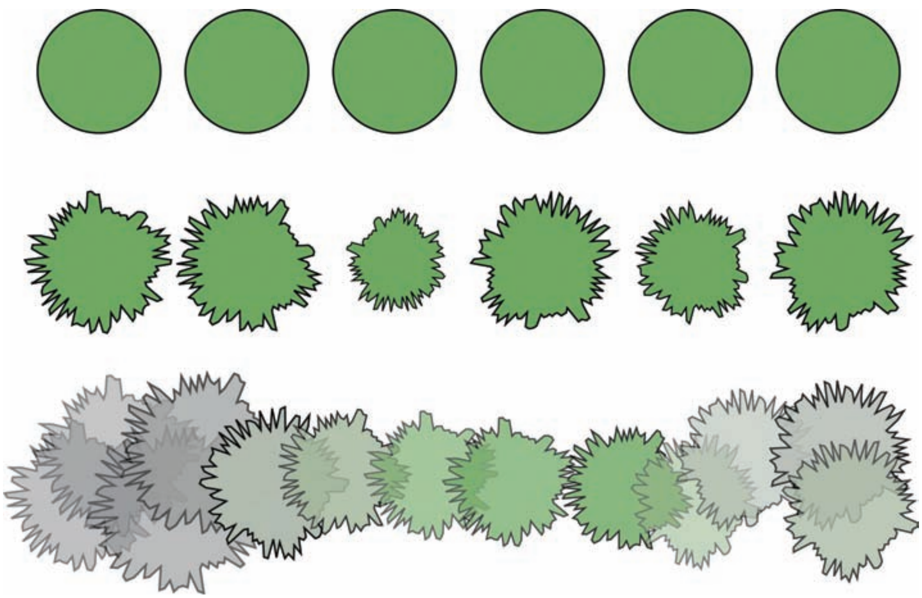


Figure 2.2. Duplication and replication is very easy with digital media. Copies of the same objects; instances with basic transformations applied; and instances with screening, tinting, and transformations applied.

Commonalities and Parallels

Although digital media differs in some ways from analog media, there are many overlaps that should be observed and taken into consideration, including drafted linework, texturing, and layering of media. The basis for almost every rendering starts with a well-drafted measured drawing with good lineweights and high-fidelity linework. This is true in both analog and digital media and cannot be overlooked, not only is it the basis for understanding design/spatial relationships but it is also the framework for the representation process. Similar to mechanical drafting, digital linework should have a consistent hierarchy that can render depth or emphasize importance and weight within a site.

Texturing in analog media can come from the interaction of media such as graphite on Canson paper or the technique in which media is applied, such as pen and ink stippling. The technique and media of an analog rendering produces a discernible aesthetic in an illustration and defines aspects of how a site is represented. This fact creates unique and compelling drawings that are products of the artist, media, and technique. In digital media, many of these aspects are flattened due to similar application of color, brushes, and effects without enough variation. When creating digital drawings, it is important to create interesting and unique interactions between the canvas, layers, and effects.

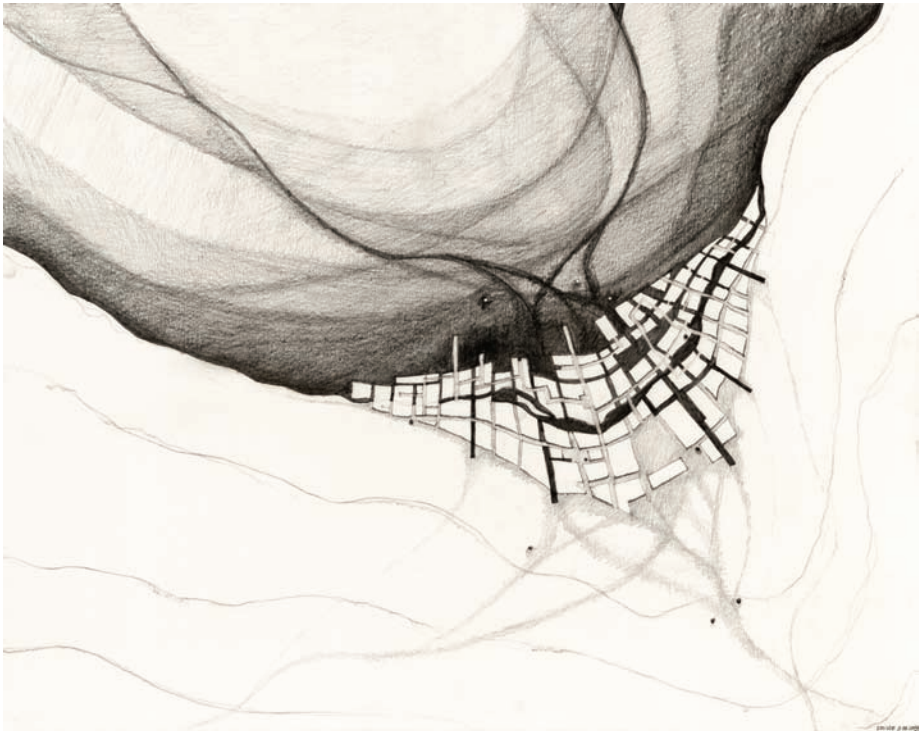


Figure 2.3. Graphite provides a range of tones that are products of the pressure, texture of the paper, and the softness of the lead. Maintaining a similar range of tones when working in digital media is important.

Layering in analog media typically occurs when media is applied successively in multiple passes, creating an interaction between colors or textures. Often times, this occurs on one canvas but can be separated through sheets of vellum or mylar with a base of color overlaid with the texturing of a finer media. Digital media provides many more options for layering, but the effects and interactions are very similar. Layers are typical components of any image-editing software. They can be used to organize drawings, but more importantly to create a series of layers with the topmost layers interacting with the layers below through transparency and screening.

Hybrid Techniques

Because there are many similarities between analog and digital media and most designers are versed or experimenting with both, hybrids are very common. An analog/digital *hybrid* refers to a drawing that may incorporate one aspect of analog media, such as a sketch, and another aspect of digital media, such as Photoshop shading and coloring. Creating hybrid drawings is an excellent way for an individual versed in analog media to explore digital techniques (and vice versa) because it allows one expertise to serve as the framework.

Figure 2.4. Linework is drafted by hand with texture, entourage, and context assembled in Photoshop.

When CAD was first introduced, it was typical for designers to draft on the computer and print to bond, mylar, or vellum. If the print was on bond, markers or colored pencils could be used to add color and shading. However, this type of rendering is often limited by the quality of the bond paper, and the linework needs to be enhanced with pen and ink. If the linework is printed to mylar or vellum, designers can create a blueprint reproduction, which is similar to bond, or the image can be rendered directly on the back side of the mylar or vellum. Rendering on the back side of mylar or vellum leaves linework that is very well defined and tones down the color overall. Neither of these examples represents a real relationship between digital and analog media, but instead isolates aspects of representation process within each medium.

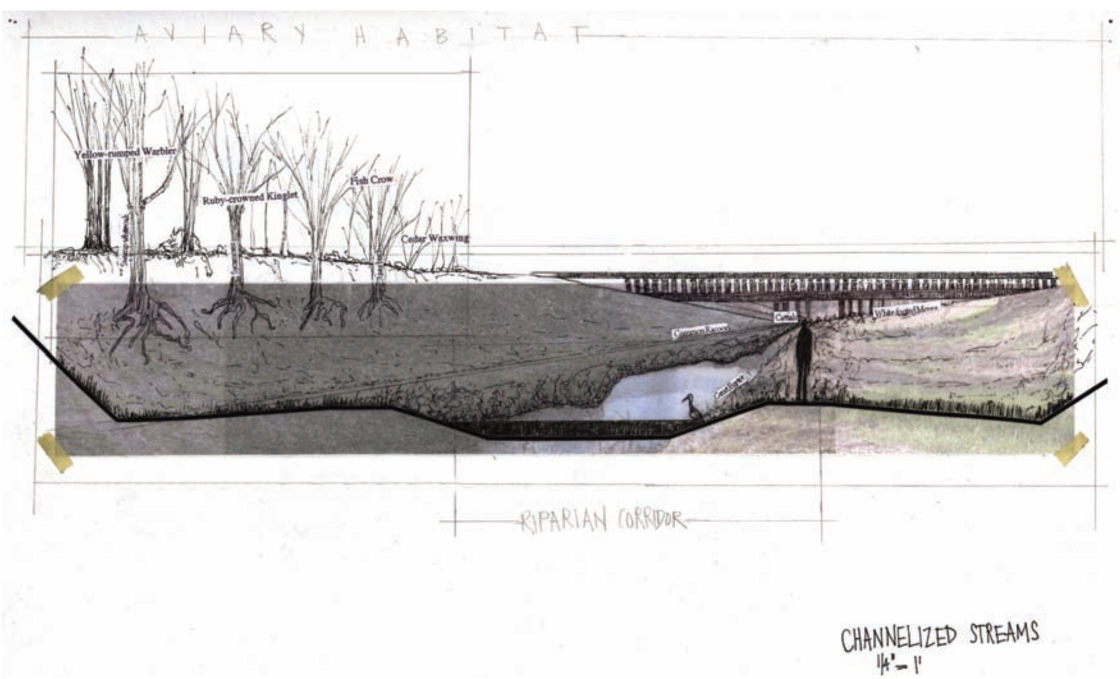


Figure 2.5. Digital photography assembled in Photoshop with hand-drafted linework.

Many other creative relationships truly integrate both media rather than isolating one from the other. It is possible to print directly to watercolor, rice, Canson, or other types of paper create a textured interaction between the printed image or linework and the paper surface. The final output can be anything that is created on the computer from imagery to CAD linework. After printing, most inks from an inkjet plotter are able to be manipulated with brush and water. This interaction between media and manipulation of one media by another provides many rich possibilities when creating design drawings.

CAD/CAM devices, such as laser cutters or 3D printers, can perform another interaction between analog and digital media. A laser cutter enables a direct relationship between two-dimensional CAD linework and a physical material such as chipboard, wood, or acrylic. The CAD linework is used to either cut or etch the surface of the material in order to create components of a three-dimensional model.

Figure 2.6. Geographical Information System (GIS) data is used to build a regional base plan that is printed across 54 sheets of drawing paper. Site features are then rendered with graphite to accentuate the expansive site.

Chapter 3
Basic Overview of Digital Concepts

Two common modes are used for storing graphic data: raster and vector. Photoshop is the primary *raster-based* program used in digital rendering. Programs like Illustrator and AutoCAD are primarily *vector-based,* although there are elements of both raster and vector tools in all of the programs.

Raster-Based Programs

Raster images are stored in a file as a set of pixels, with each pixel representing a single area of color in the drawing.

Figure 3.1. Image at full resolution.

Figure 3.2. Area shown in detail in Figure 3.3. This is an area of 20 × 20 pixels.

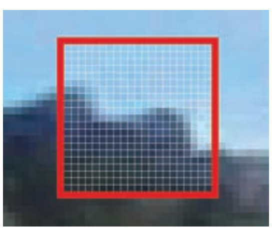


Figure 3.3. The full-resolution image is composed of individual pixels. Each pixel represents a single color and cannot be subdivided. It is the smallest unit in a raster image.

The *pixel* is the smallest unit in an image, and it cannot be subdivided. The overall image is created by the combination of a large number of pixels. When an image is printed or displayed on a screen at normal resolution, the individual pixels are so small that they are not noticeable to the human eye. When the pixels are small enough, the illusion of a continuous image is created.

The number of pixels in an image determines the overall size of the raster image. If an image is said to be 1200 × 800 pixels, it means that there are 1,200 pixels across and 800 pixel from top to bottom.

Resolution in Raster Images

When a raster image is printed, the quality of the final image is determined by the resolution of the image. In terms of printing, *resolution* refers to the number of pixels per inch on the printed paper. If the number of pixels per inch (ppi) is too low, you will be able to see the individual pixels when the image is printed. This kind of image is often referred to as a *pixelated* image.

The resolution determines the size of each individual pixel on the printed page, as well as the overall size of the image: the higher the resolution, the smaller each individual pixel and the smaller the overall image. For example, if an image that is 100-pixels wide by 100-pixels high is printed at a resolution of 10 pixels per inch, the final size of the printed image would be 10″ wide by 10″ tall, the size of a standard piece of paper.

Each pixel in this image would be 1/10th of an inch tall by 1/10th of an inch wide. At this resolution, the image is pixelated: the pixels are large enough to be seen individually by the human eye. If, however, the image is printed at a higher resolution of 100 pixels per inch, the overall size of the image would be 1 inch and each individual pixel would be 1/100th of an inch wide by 1/100th of an inch tall. This resolution would be referred to as 100 pixels per inch or 100 ppi. One hundred pixels per inch is typically the minimum resolution needed to create the illusion of a continuous image, or a *nonpixelated image*.

Figure 3.4. If individual pixels are visible in the printed image, the image is said to be *pixelated.* The original image shown in Figure 3.1 is 2500 pixels × 1875 pixels. This image has only 200 pixels × 150 pixels and therefore it appears pixelated.

For a printed page, you would need a minimum of 150 ppi to avoid pixelating the image. In practical applications, however, the minimum resolution required to create a nonpixelated image differs according to how the printed image is being displayed. Images that are going to be viewed up close, such as images in a book or on an 11″ × 17″ sheet of paper, need a higher resolution than images that are printed in a large format. Large format images that are viewed from farther away may need fewer pixels per inch to create a nonpixelated image.

Higher resolution leads to a higher-quality image. However, frequently an image is not large enough to be printed at a high resolution and at the size needed for presentation. To print an image as large as possible without resorting to upsampling, which can reduce image quality, it is important to understand what resolution is needed to print images that do not look pixelated. Here are some general guidelines for the minimum resolution that can be used without causing pixelation.

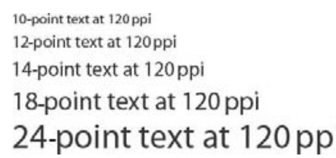


Figure 3.5. Larger fonts read from further away on large images can be acceptable for presentation. Smaller fonts at 120 ppi are usually unacceptable.

Table 3.1. Minimum Resolution Guidelines

Image Size	Lowest Acceptable Resolution	Optimum Resolution
11 × 17 or smaller	200 ppi	300 ppi or greater
24 × 36 or smaller	150 ppi	200 ppi or greater
larger than 24 × 36	120 ppi	150 ppi or greater

This assumes that the larger printed images will be viewed from a distance and not meant to be read from up close. At 120 ppi, fonts smaller than 14 point will be fuzzy. At 100 ppi, fonts smaller than 22 point will likely be fuzzy.

Upsampling and Downsampling

Upsampling increases the number of pixels in an image, and *downsampling* decreases the number of pixels in an image. It is important to make a distinction between *image size,* which is the number of pixels in an image, and *resolution,* which is related to the printing of an image. An image of the same "image size" can be printed on 11″ × 17″ paper or on a 4″ × 6″ paper, depending on the resolution. The size of the print is not the same as the size of the image. Typically, these issues become important when images are too small for the desired output. An image that is sharp at 4″ × 6″ may be pixelated if printed at 11″ × 17″. If the image needs to be printed at 11″ × 17″, there are two choices: lower the resolution and risk pixelation or increase the image size through upsampling and risk a fuzzy image.

If you want to increase the output size of the image beyond the limits of the resolution, you can upsample the image. *Upsampling* means adding more pixels to an image so that you can print a larger image at a resolution that does not cause pixelation. However, upsampling an image often causes a loss of quality in the image. As you saw in the previous section, simply enlarging the size of the drawing by lowering the resolution will cause the image to appear pixelated. Upsampling actually increases the number of pixels in the image. Several algorithms are used to upsample an image, but they all work in basically the same way. Upsampling spreads out the existing pixels and then attempts to create new pixels to fill in the gaps.

Figure 3.6. This is the original image at full resolution of 2500 × 1875 pixels.

Figure 3.7. This shows the original image downsampled to 200 × 150 pixels. Many of the pixels that created the detail in the original image were discarded during the downsampling.

Figure 3.8. The upsampled image shows the effects of adding pixels to an image. The pixels that were lost during the downsampling are approximated in the upsampling process. Upsampling generally causes fuzziness and ghosting in the image.

The problem with upsampling is that when the program fills in these new pixels, they do not always perfectly match the existing pixels. It is extremely difficult for the software to create new pixels that make sense within the overall image, because the software does not know what the image represents. After an image is upsampled, it is typical for the image to be fuzzier and linework to have a halo or echo effect.

If an image is not large enough to use in a project, upsampling can often be an acceptable technique for increasing the image size to avoid pixelization. Despite the limitations, sometimes the degradation of the image is negligible and it is worth testing the results. The easiest way to upsample an image is to adjust the image size from within Photoshop. Photoshop has several upsampling algorithms built into the software, so it is worth testing the different algorithms to see which one is the most effective for a particular image. To upsample an image, using Photoshop:

1. **Go to Image > Image Size from the menu.**
2. Choose the Bicubic algorithm, or one of the other algorithms provided in the drop-down menu.
3. To resize the image and increase/decrease the number of pixels in the image, choose the Resample Image option.
4. To keep the same proportions for the image, choose the Constrain Proportions option. If this option is not checked, the image may be stretched horizontally or vertically.

As the image size changes, the file size also changes.

You will notice that doubling the size of the image increases the file size by a factor of 4. This increase is less of a factor as computers become faster and storage media becomes less expensive, but it is still an issue to be aware of—especially if the files are being transferred via email or uploaded to an FTP site.

Downsampling is the process of removing pixels from an image to make the image smaller. Downsampling does not have the same issues with image degradation as upsampling. It can be accomplished using the same Image Size dialog box in Photoshop. Instead of increasing the number of pixels, reduce the number of pixels.

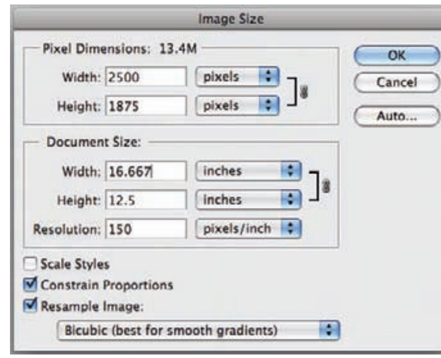


Figure 3.9. The Image Size dialog box.

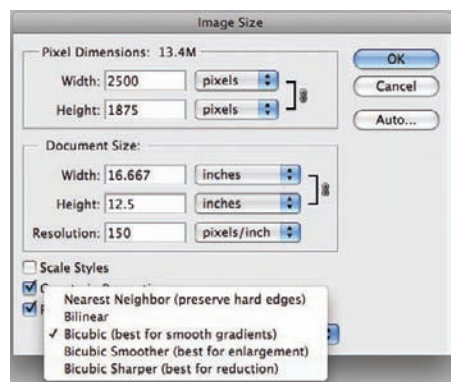


Figure 3.10. Sampling algorithms.

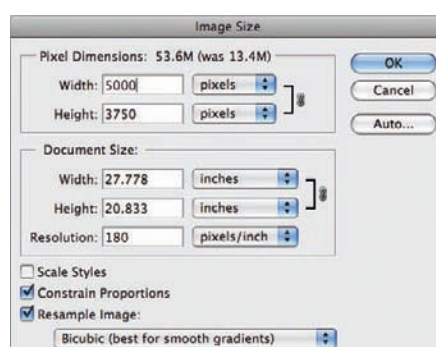


Figure 3.11. Increasing the width from 2,500 pixels to 5,000 pixels quadruples the size of the file.

Vector Images

Vector images contain different data to describe a drawing than raster images contain. Vector images use a series of coordinates and formulas to describe the image that are independent of the scale of the drawing. In vector graphics, a formula behind each piece of the

image describes how it is to be drawn. Compared to raster images, this has the advantage of allowing documents to be printed at almost any scale without the loss of image quality. It also typically results in smaller file sizes compared to raster images. This is a simplified example of how a vector-based program might describe a line:

Draw Line from point 2,2 to point 7,7; Color Red; Thickness .01 inch.

A vector-based program has the ability to draw that line at any size and scale the thickness, depending on the desired output size. Unlike raster-based programs, there is no need for upsampling to increase the size of the print.

Vector linework is also editable in a way that raster images are not. In a raster representation of a line, the line is constructed of pixels that when seen together form the illusion of a smooth line. However, the line cannot be selected in the same way as a vector line.

Using Raster Images in Vector-Based Programs

Many different graphics techniques, such as importing a base map into Illustrator, use raster images in vector-based programs. Although vector-based linework created in programs such as Illustrator can be scaled to any size, the raster images imported to these programs are subject to the same issues of image size and resolution as discussed in the raster section. The raster image must be properly sized for the final output before being imported into the vector-based program. If a vector-based file is increased in scale, the raster image will suffer from the effects of upsampling just as if it were in a raster-based program.

Conversely, there are often times when vector-based linework will be imported into a raster-based program such as Photoshop. This technique is most often used when creating plan renderings that use AutoCAD linework as the basis for the plan. When the vector linework is imported into Photoshop, it is *rasterized* or converted from an editable vector line into pixels.

Figure 3.12. The color wheel.

Color

When a designer begins to illustrate, their first step after creating the base linework is to begin adding color and develop an overall color scheme. Before adding color, it is important to have a basic understanding of color theory in order to develop an illustration that has the effect. The basic tool for combining colors is the color wheel, which consists of 12 colors based on the RYB color model. The RYB color wheel consists of three primary, three secondary, and six tertiary colors. The primary

colors are red, yellow, and blue; these three colors can be mixed to create the three secondary colors green, orange, and purple. The six tertiary colors can be created by mixing combinations of primary and secondary colors.

Primary colors Secondary colors Tertiary colors

Figure 3.13. Primary, secondary, and tertiary colors.

Each color can be referred to in terms of tint, shade, and tone. *Tint* refers to taking any pure hue and adding white to make it lighter. If you add black to make any pure hue darker it is called a *shade.* Adding gray to any pure *hue* creates a *tone.*

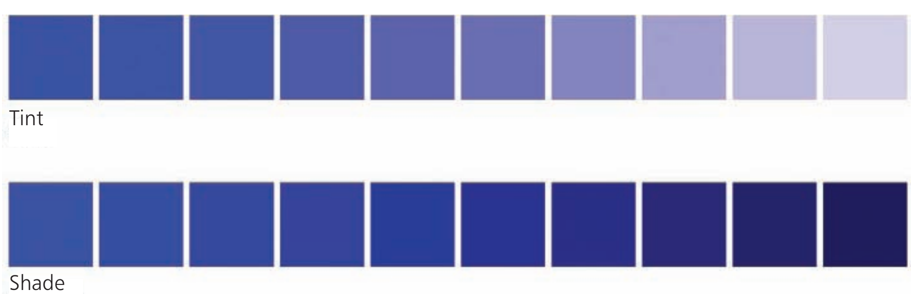


Figure 3.14. Swatches palette displaying tint, shade, and hue.

The color wheel can identify several color harmonies that consist of two or more colors from points on the color wheel. *Complementary color* refers to colors that are opposite one another on the color wheel. The most common are red and green, which create a vibrant color scheme. Complementary color schemes can be very strong, especially at full saturation, and should be used sparingly. Complementary schemes work well when it is important to make objects stand out. A variation is the split-complementary scheme, which uses a base color and the two colors adjacent to the complement. In general terms, the split-complementary scheme has the same contrast as a normal complementary scheme, without being as strong.

Complementary

Figure 3.15. Complementary color wheel

Split complementary

Figure 3.16. Split complementary color wheel

Analagous

Figure 3.17. Analagous color wheel

Triadic Rectangular Square

Figure 3.18. Triadic, rectangular, and square color wheels.

An analogous color scheme uses colors that sit next to each other on the color wheel. This typically produces a subdued color scheme that maintains an equal hierarchy between the colors. It is common for plan renderings to use an analogous scheme with complementary colors to highlight specific elements. Three other common schemes are the triadic, rectangular, and square color arrangements. *Triadic* uses colors evenly spaced around the color wheel, *rectangular* uses two pairs of complementary colors, and *square* also uses two pairs but they are evenly spaced around the wheel. Each of these three schemes works best if one color is dominant and the other colors are used as accents.

It is important to continually evolve illustrations and, therefore, it is worthwhile to sample color palettes from old drawings. Doing so is a common starting point for many illustrations and, therefore, it is appropriate to start from a defined color palette. It is

also important to experiment and evolve the work, but there is no need to start from scratch every time. Another resource available is Adobe's Kuler website (kuler.adobe.com), which allows you to save and share your color palettes and user-defined color palettes with other artists. You can also use tools to develop color palettes based on the previously mentioned schemes.

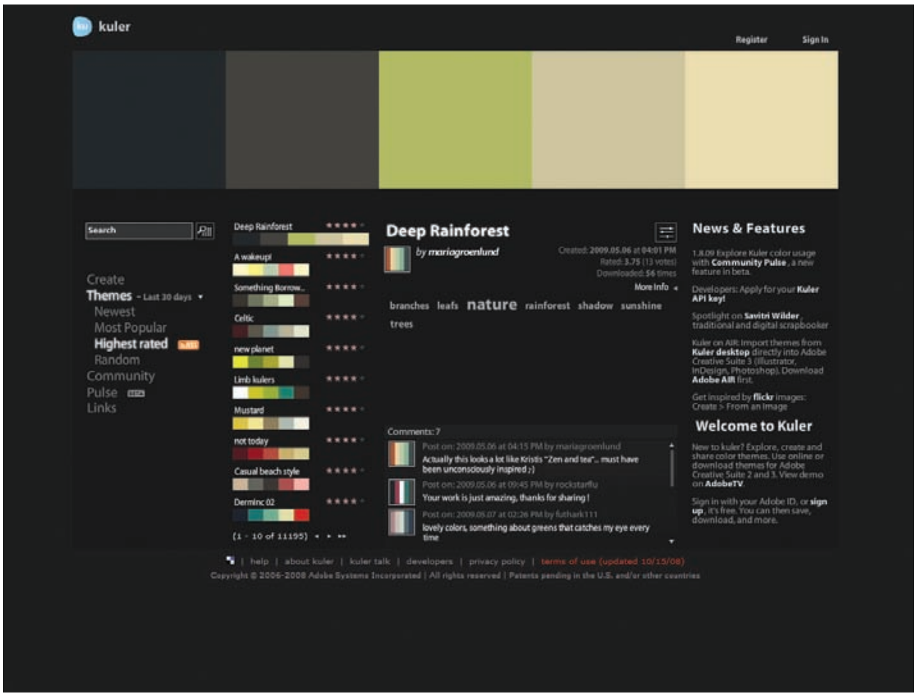


Figure 3.19. The Adobe Kuler website (http://kuler.adobe.com) provides an excellent starting point to test color combinations.

Chapter 4
Digital Drawings in the Design Process

Because both hardware and software tools are used to create digital representations of the landscape, it is important to understand how to apply them. Why would someone use a vector-editing application for one task and a raster application for another task? There are many answers to these questions, and every designer has different opinions, but it is possible to discuss some specific cases that may shed light on this topic.

Applications for Specific Tasks

When any orthographic, measured drawing is being created, it is necessary to use vector-based drafting software. Typically, a CAD application such as Autodesk AutoCAD, Nemetschek Vectorworks, or Graphisoft ArchiCAD can be used. CAD applications are tailored drafting tools that are engineered for accuracy, which is required when representing design proposals that are intended for construction. The measured drawing, whether it is a site plan or section/elevation, is the basis for all subsequent work and must be created with CAD or something equally accurate. Equivalent results can be hand-drafted drawings or scaled drawings created with a vector illustration software package such as Illustrator. A measured/drafted drawing should never be attempted using raster-based software such as Photoshop; the result would be inaccurate linework.

A rendered plan or section/elevation can be developed in many different software applications, based on an accurate, drafted plan. Depending on the final product, vector software and raster software are best suited to perform specific tasks. Raster-based image-editing software, such as Adobe Photoshop or GIMP, excels when creating richly textured and blended illustrations using tools that are similar to analog brushes and pencils. Brush tools allow designers to quickly represent complex landscape surfaces with ambiguous edges. Other tools make it possible to quickly integrate textures or context from photographs as well as make adjustments across an entire canvas within multiple layers. The downside is that when a raster drawing is started, the final output size needs to be determined in order to avoid pixelation. If the images being worked with are large, file size also becomes an issue with raster images. It is very easy to create an image

that is over 1.5GB when working on an illustration that is 36″ × 48″ at 120 dpi. File size is becoming less of an issue because Photoshop CS4 has transitioned to 64-bit (Windows only) and can use over 4GB of system RAM.

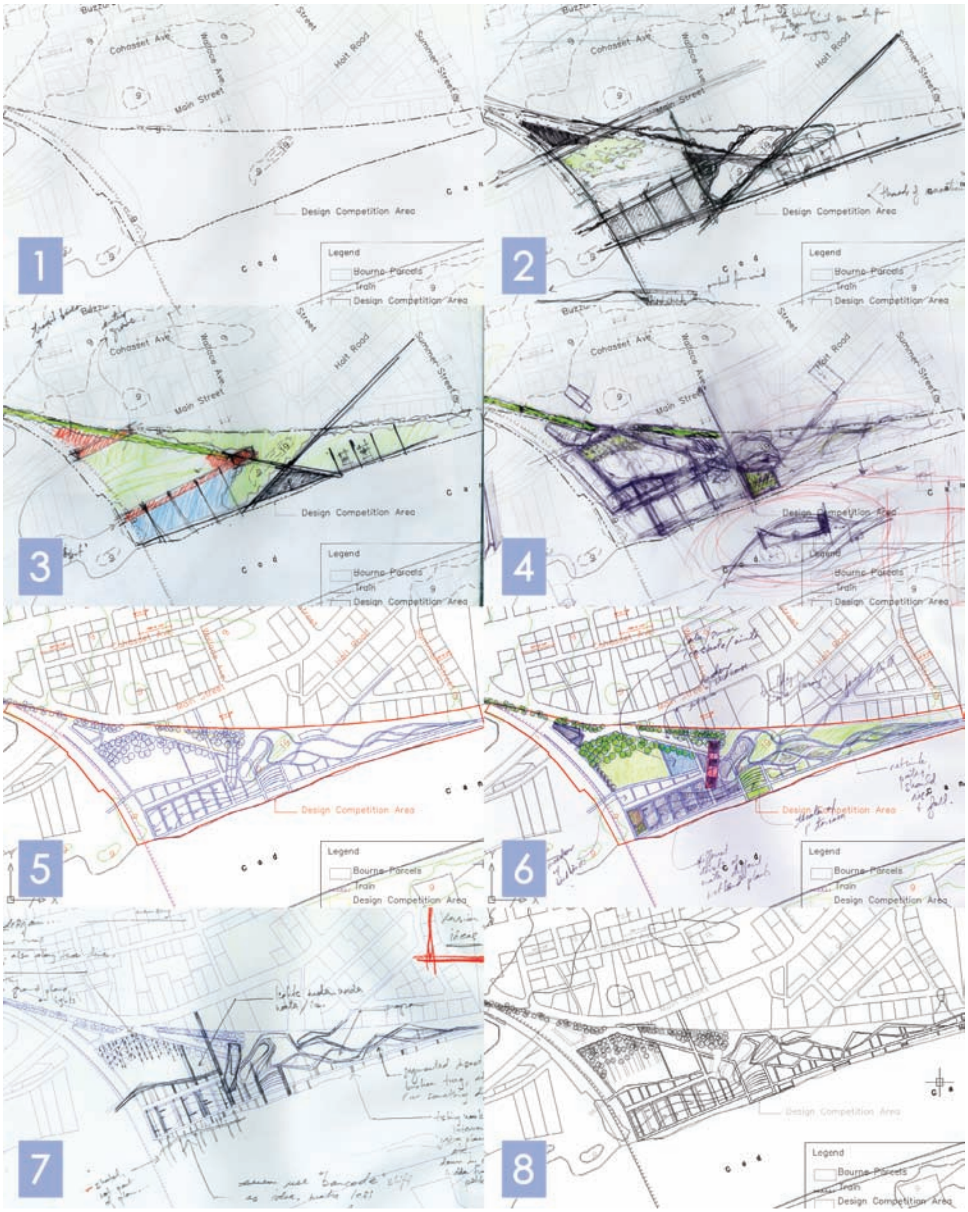


Figure 4.1. The design process must fluctuate between analog and digital techniques. This sequence of images shows the evolution of a site design through iterative analog and digital representations.

Vector illustration software, such as Adobe Illustrator, excels at tasks that require precision and flexibility in the final image size. You can use it to make small refinements and adjustments to CAD linework, including minor drafting or lineweight changes. Typically, most text, labels, and leaders can be created with vector-editing tools because of the crispness that vector software provides. Text and leaders are also easier to edit in vector software, allowing labels to be quickly moved or changed and leader lines to be readjusted as elements are added or subtracted. If your drawing-size requirements change, you can scale vector elements up without worrying about pixelation. The downside to vector-based applications is that everything is represented as objects; therefore, oddly formed elements are difficult to blend together. Vector drawings can also be difficult to organize due to the large number of objects required to create complex illustrations.

Moving between Analog and Digital Techniques

Generally, analog drawings are static, representing stages of design. The static nature of analog drawings is expanded through layering and reproduction, creating new drawings from remnants of the past. Each reproduction is slightly altered or changed, creating small or large evolutions in successive stages of a drawing. For the most part, this changes when the process becomes digital, where reproduction occurs with exacting tolerances and revisions are compiled within a single file. This relationship is important to consider as drawings move back and forth between analog and digital environments.

Typically, drawings are created in analog and move toward digital as they are refined. For example, many design concepts will start with sketches, progress to CAD alternatives, and then are refined and rendered for client presentations. This process has formed due to the representational skills of senior design professionals and young designers. In most cases, the senior designer will feel more comfortable with analog processes and will sketch or draw ideas that are then passed to junior designers who are more facile with computer technologies. In many cases, the process of digital representation transcribes the analog and then slowly refines itself through phases of the design process. This process relegates either medium to a confined portion of the design process and does not promote a rich interaction between a design team's hierarchy.

On a smaller scale, it is also possible to use digital data, such as a CAD model as the framework for a hand-rendered drawing. The CAD model can be a simple massing to explore volumetric relationships or may be a detailed building model. This process requires the composition to be completed digitally and then printed or projected to complete an analog drawing. The detail of the digital information affects this process; less detail allows the analog rendering to make inferences; the opposite holds true when a more-refined digital model is used. This process is typically efficient, as it utilizes the strengths of each medium and the designer but tends to forgo a real relationship between digital and analog processes.

Figure 4.2. Early design sketches may begin in an analog medium and progress to a digital version generated by CAD linework.

Ideally, digital and analog media find a middle ground, where an exchange of information can occur. As a designer, you need to understand how drawings inform one another in order to make decisions at each stage of representation process. The final result for either medium is to create drawings that accurately represent design ideas, evoke the experiences being designed, and contribute to the design process.

Part 2
Base Imagery

Chapter 5
Setting up the Document

In the world of digital media, the word "document" is an ambiguous term used to describe the AutoCAD workspace, the Photoshop canvas, and the Illustrator artboards. Nearly every digital media application requires the user to define the document setup during the initial stage of the creation process. When designers first embark to create an illustration, they must carefully consider the type of surface on which the final product will appear—whether it is a physical canvas, watercolor paper, or a sheet of vellum. Through experience, a designer learns how to plan the final output and predict how different formats will translate between different media.

When first setting up a drawing in a digital media application, many novice users assume that anything can happen. They simply start to work, thinking the image can be printed at any size or scale desired. This is not always true, especially when dealing with raster images or vector layouts with raster image links. Typically, it is possible to change or modify the document setup, but there are limitations that must be considered before proceeding.

Drawings at Multiple Sizes

Setting up the document to be flexible is key to creating a fluid digital workflow. One of the first things to consider when setting up a document is what the final output is likely to be for the drawings. In contemporary practice, a single drawing is likely to be presented in many different formats: as a printed document on a presentation board at 24″ × 36″ or larger, as an image in a bound document at 8.5″ × 11″, as a slide in a public presentation on a digital projector, or as an image on a webpage. Thinking about how all of these images will be created from a single set of drawings is critical to producing efficient and effective drawings.

The basic rule is to create the drawing at the largest size likely to be needed, especially if the drawing is brought into Photoshop at an early stage in the process. As discussed on pages 24–25, the size to which a raster image can be enlarged is limited. For example, if a plan is set up for 11″ × 17″ output and rendered in Photoshop for that output size, it will be difficult to use the same drawing for a 24″ × 36″ print if the need arises later. However, a 24″ × 36″ drawing can easily be printed at 11″ × 17″.

How Drawings Move through the Digital Workflow

Another issue to consider is how the drawing data will be transferred from one program to another. As discussed previously, drawings will move between several software applications before they are completed. Just how this movement occurs depends on how the drawing is set up in the beginning. There is usually more than one way to sequence the movement of the drawing through the software to get the same result.

For example, to complete a drawing you could:

1. Start with an aerial photograph in Photoshop.
2. Add existing CAD data (contour lines or property lines) to the aerial image in Photoshop.
3. Link the Photoshop file into Illustrator and draw a diagram over the aerial/CAD information.
4. Label and print the drawing from Illustrator.

Alternatively, to get the same results you could:

1. Import the CAD data into Illustrator.
2. Draw and label the diagrams in Illustrator using the CAD data as a base.
3. Import the aerial image from Photoshop as an underlay.

As discussed on pages 12–13, certain programs are better for certain tasks. Thinking about these issues in advance will prevent situations where you are forced to lose drawing flexibility or degrade your image through multiple rasterizations or color mode changes.

Setting the Image Size

One of the key issues in setting up your document is to reduce the amount of upsampling you must do to create images at all of the sizes you need for output. The simplest rule is to set up your images at the largest size you expect to output. This is obviously more critical for raster images that you will be using in Photoshop. The issues of resolution and the difference between raster and vector drawings were discussed on pages 12–13. If you are working solely in Illustrator or CAD, with no aerial images imported from Photoshop, you do not need to worry about the document size at the beginning of the process, as Illustrator and CAD are vector-based programs. As shown on page 13, vector-based programs can easily be scaled up or down with no loss of quality. However, if you import vector linework into Photoshop, you will need to consider these issues. Anytime you move your drawing into a raster-based program, such as Photoshop, you should consider the setup size of the drawing.

For example, if you think you will print an image at 24″ × 36″ for a presentation, you should set your drawing to be 3600 × 5400 pixels wide, or 24″ × 36″ at 150 pixels per inch. When a new document is created by selecting **File > New,** the following dialog box is used to set the size of the document.

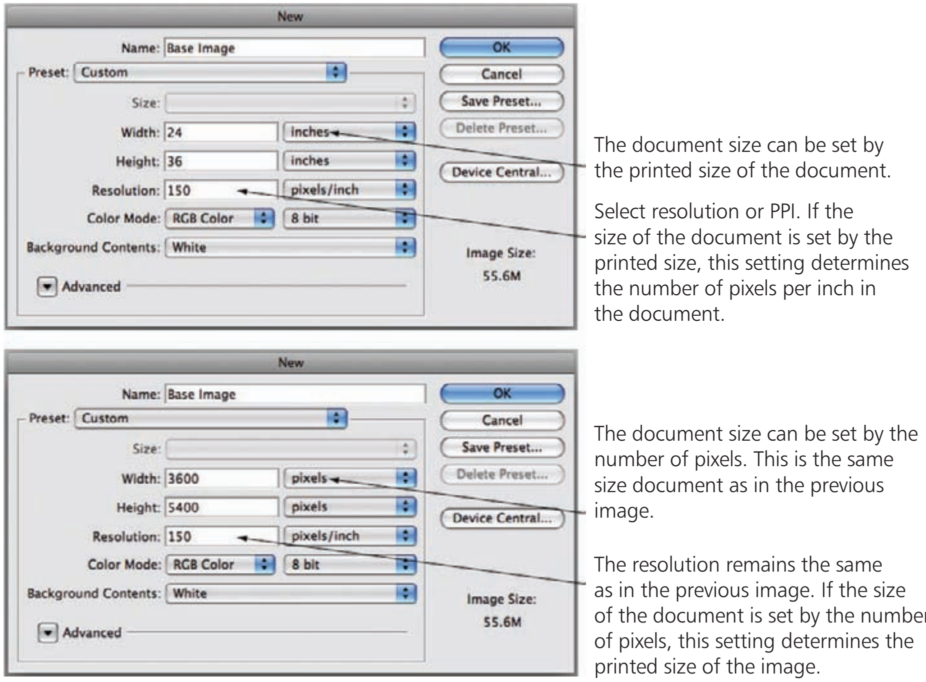


Figure 5.1. There are two ways to establish the size of a new document.

By setting the document to the largest size likely to be printed, the image is less likely to need to be upsampled later in the process, which would likely degrade the quality of the image. The relationship between the pixel dimensions and the resolution can be seen once the document is created by selecting **Image > Image Size**.

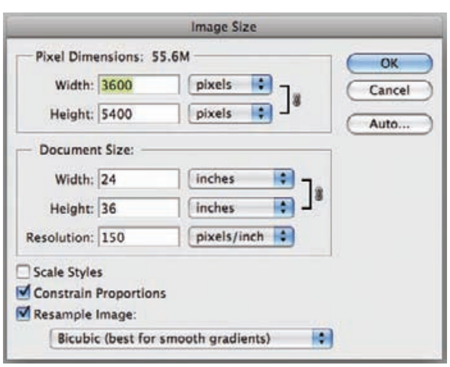


Figure 5.2. Once the document is created, the **Image > Image Size dialog box** shows the relationship between the Pixel Dimensions and the Resolution.

The one issue that might cause you to limit the size of your document is the speed of your hardware. If your drawing is extremely large and your hardware has limited capacity, your computer may slow down so much that it is not feasible to work at the maximum size of your final output. If this is the case, and you cannot move to a faster computer, there are a couple of techniques that you might use to speed up your working process.

The first is to create the drawing at the smallest possible size needed to get a good-quality, nonpixelated image. For example, you could set the resolution of your 24″ × 36″ image to 120 ppi instead of 150 ppi. As we discussed on page 25, an image at this resolution is sharp enough to be acceptable for use in most situations. The savings in terms of file size between 120 ppi and 150 ppi is almost 40 percent. A 24″ × 36″ file at 150 ppi requires 55MB, while the same file at 120 dpi requires 35MB.

However, a Photoshop file with only one layer is rarely too large for hardware to handle. The 55MB file used here is not likely to cause problems. Usually, a file only becomes too large for a system after multiple layers are added. There are several techniques that can be used to work with large, multilayered files while maintaining a high-resolution image. In most cases, it is better to keep the file at the desired resolution and use some of these techniques than it is to work with a smaller image. We discuss techniques within Photoshop for working with large files on page 217.

Chapter 6
Base Imagery and Scaling

Typically, digital illustration begins with some form of aerial photography, linework, or site photos. When a designer is working with any orthographically projected drawing, such as a plan or section/elevation, having the base imagery at a known scale is critical. It is not possible to use drawings that are not-to-scale for any serious design decisions. Without a scale, the images and linework have no relationship to the “real world.” This holds true in both analog and digital media.

Figure 6.1. An aerial photograph altered in Photoshop to desaturate the image, combined with contour lines created in AutoCAD and water bodies on the site drawn in Illustrator.

Two types of photographs are typically used as base images in design projects: aerial and site. Aerial photographs provide an overview of site conditions and are typically recorded at a specific resolution, making it is possible to scale based on pixels or through known measurements between elements on the photograph. When scaling is based on the distances in an aerial photo, the results are not extremely accurate; this inaccuracy must be taken into consideration as a project moves forward. Pixelation, earth curvature (in large images), and lens distortion can make it difficult to create an accurate base plan. A CAD plan traced from an aerial photograph is no substitute for a properly acquired site survey. Multiple aerial photographs (quads or tiles) can be assembled to create high-resolution images of a large area or to serve as the context for further design and representation work.

Site photographs are another important method of obtaining base imagery for an illustration. Site photography is typically used to create context for sections/elevations or textures in plan renderings. It is important to remember that site photographs are not orthographic images and, therefore, cannot be scaled unless compared to another orthographic drawing. For example, CAD linework for an elevation can be used to align existing context; often times doing so may require stretching the site photos in order to fit them to an orthographic projection.

Aerial Photography

Aerial photography is a common base for large-scale site design projects. The rise of online databases such as TerraServer, Google Earth, and GlobeXplorer (which offer easy access to aerial photography) has made the use of aerial photographs a key component in the early stages of most large-scale design projects. One of the reasons aerial photography is often used at the beginning of a project, or in a speculative project such as a competition, is that you can start work immediately before a site survey is completed. For academic or speculative projects, a CAD base is often created from an aerial photograph due to the lack of survey information. Aerial photography can be used in conjunction with Illustrator at the beginning of a project as a diagrammatic tool to show site boundaries, site analysis/inventory, and initial design concepts.

Or, an aerial image can be used with a project to provide context to the site plan.

Figure 6.2. The same aerial photograph used as a background image for the site plan.

Obtaining the Aerial Photograph

Several sources for aerial photography are available on the Web. The U.S. Geological Survey (USGS) has a large database of aerial photography that can be viewed for free from the Internet via the TerraServer website; use of this material is subject to copyright restrictions. Google Earth has an ever-evolving set of data, also subject to copyright restrictions, that can be used for projects. For most long-term projects, high-resolution aerial images will need to be purchased from commercial courses such as GlobeXplorer or provided by the client.

Tiling Aerial Photographs in Photoshop

Several different methods are used for tiling together separate photographic images. If a site is large and a high-resolution base image is needed, several high-resolution aerial images may need to be tiled together. The technique of tiling images together is used most frequently to create panoramic photographs.

Figure 6.3. Several photographs can be tiled together to create a panoramic image of a site. A similar technique can be used to tile together several aerial images to make a composite aerial to use as a base.

The separate images can be tiled *by hand* or tiled automatically using software. Photoshop's Photomerge tool automates the tiling of separate images, and several other standalone software packages will perform the same task. The following example shows the process used to tile together several aerial images, but the process works the same for tiling site photographs into a panoramic image.

Manual Method

The manual method involves lining up each separate image by registering common areas on both images. This method is referred to as "manual" because the images are assembled using the mouse and the Move tool in Photoshop. Although there are automated methods for tiling photographs, the manual method is useful for adding aerial images to the base material midway through a project. For example, if the drawing is mostly completed and the base needs to be expanded to include a new part of the site,

it is often easier to insert the new aerial images manually rather than reassemble the base material using Photomerge.

For the images to be tiled by hand in Photoshop, the individual images need to have some overlapping areas or common edges with which to register the images. The following steps provide an example for tiling images by hand:

1. Place the two images to be tiled on separate layers in the drawing. Make the upper layer active.

Figure 6.4. The two images to be merged should be on separate layers. The image on the upper layer has a reduced opacity to facilitate its registration with the lower image. To register an image, find a landmark in both images and move one image over the other. In these images of New Orleans, Jackson Square is present in both images and can be used as a registration mark.

2. Reduce the Transparency of the image on the upper layer to 50 percent.
3. Use the Move tool to register the two images. Once the images are close to being in the correct positions, use the arrow keys to nudge the image into place.
4. Return the Transparency of the upper layer to 100 percent.
5. Select both layers by holding down the Cmd/Ctrl key and clicking on the layers in the Layers palette.
6. Right-click the layers and select Merge Layers to create a single layer from the two images. Merging these two layers is not necessary if the layers need to be kept separate for future editing. Merging the layers has the advantage of creating a less cluttered Layers palette.

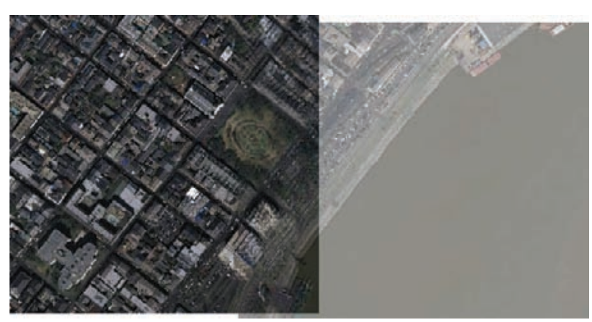


Figure 6.5. Use the Move tool to register the images. Once the images are in close proximity, the arrow keys on the keyboard can be used to move the image in small increments to fine-tune the registration.

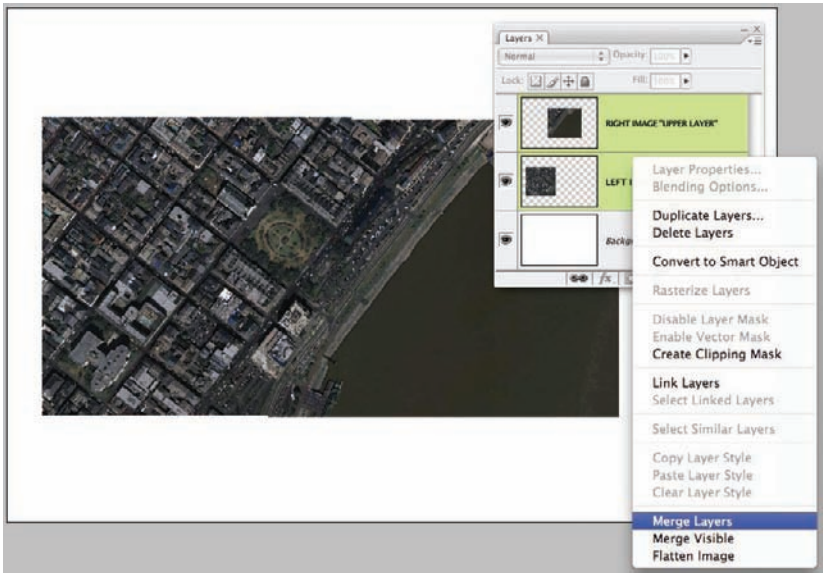


Figure 6.6. Merging the layers makes the Layers palette less cluttered. The individual images could also be collected in a Group in the Layers palette if the images need to be edited again later.

7. Additional images can be added at any point in the project. However, the size of the canvas may need to be increased to add them. This can be done using the **Image > Canvas Size, which will open the Canvas Size dialog box**. Increasing the canvas size differs from increasing the image size because it does not affect the resolution of the image.

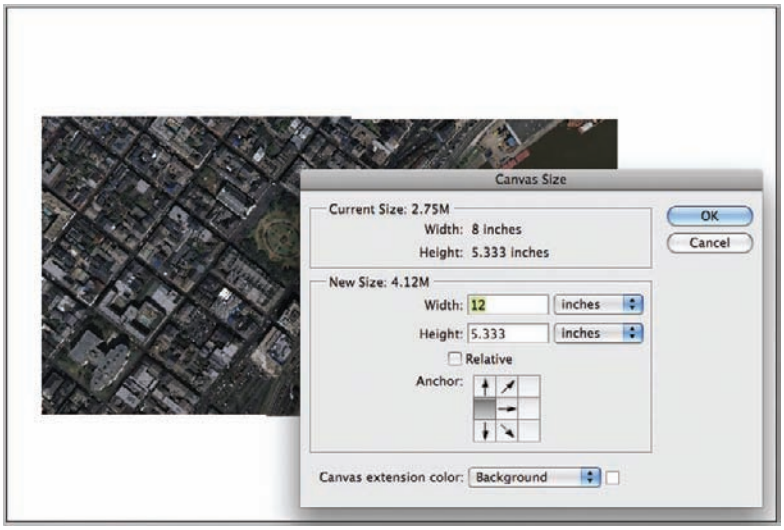


Figure 6.7. If another image needs to be added to the right side of the current image, the canvas size needs to be increased to accommodate the additional image.

Tiling Photographs with Photomerge

Several software applications are available to automate the process of tiling separate images into a single image. Photomerge in Photoshop is one of the most readily available tools for merging photos, but other third-party applications work in a similar way.

The following steps provide an example for tiling images using Photomerge:

1. The images that will be tiled should be saved as separate files and placed in a folder on the hard drive. Each image must overlap the images that will be adjacent.

Figure 6.8. All downloaded images to be tiled must have areas of overlap with the adjacent images. This example has 10 images to be tiled.

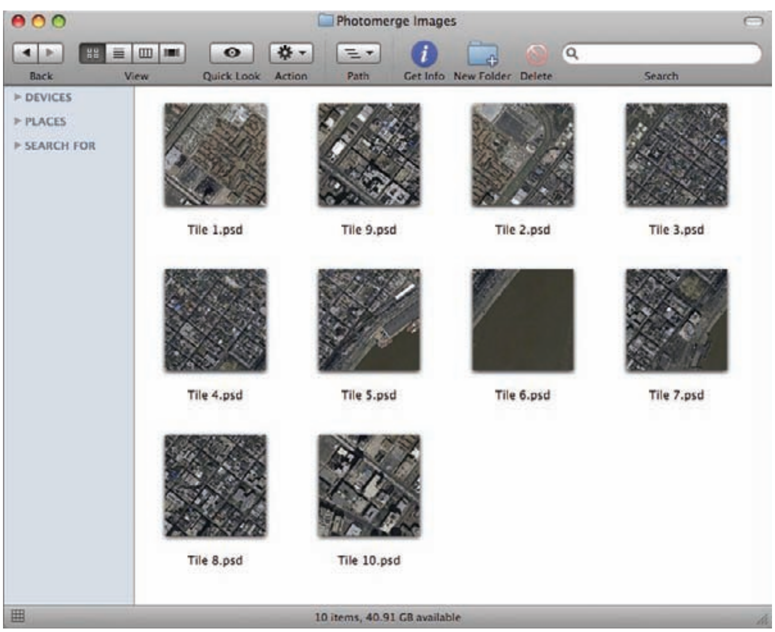


Figure 6.9. The images can be put in a single folder to facilitate the Photomerge operation.

2. Open the Photomerge operation from the **File > Automate > Photomerge menu**. Using the Browse option, load the files to be tiled. If the files are in a single folder, select the Folder option from the drop-down menu. The Photomerge dialog box offers several options for tiling the images. For a set of aerial images, the Reposition Only option is the correct choice. If the images being tiled are panoramic photographs with varying perspectives, the Auto or Perspective option is the most effective. The Interactive Layout option is useful for images that do not easily arrange themselves on the first pass. This option allows the images to be manually repositioned before the final compositing.

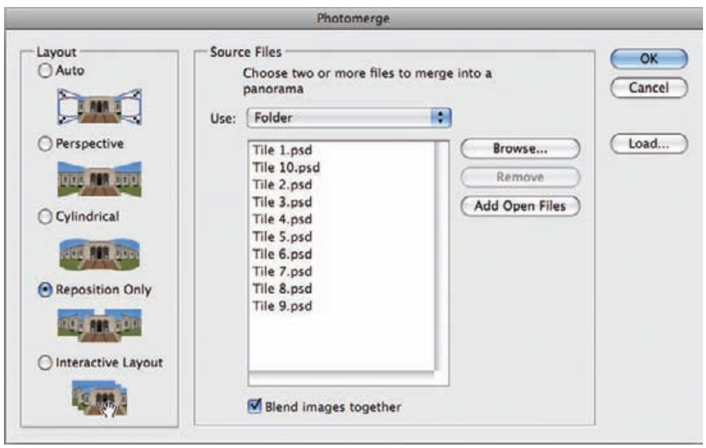


Figure 6.10. Using the Browse option, load the files that will be used for the tiled images into the Photomerge dialog box. For aerial images, use the Reposition Only option to tile the images without changing their proportions. For panoramic photos, the Auto option and the Perspective option offer the best choices.

3. The result of the Photomerge operation is a new file with all of the tiled images arranged on separate layers with a layer mask attached. These layers can be kept separate or merged into a single image.

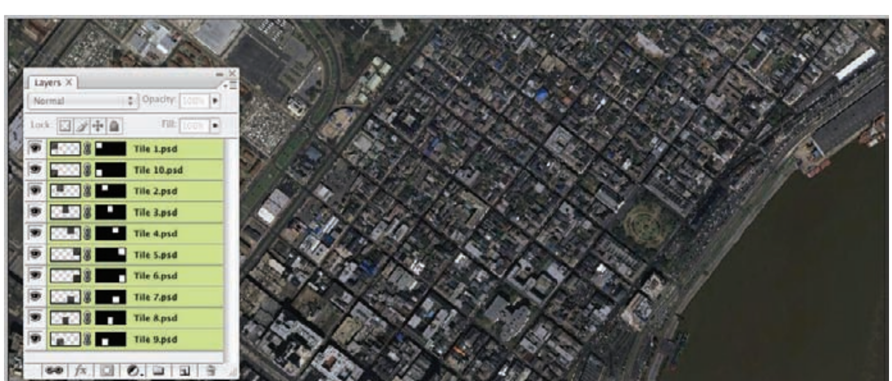


Figure 6.11. The result of the Photomerge operation is a new file with each image on a separate layer.

Scaling the Aerial Photograph

Getting the correct scale is one of the most critical issues for importing an aerial image into a project. Geographical Information System (GIS) packages, such as ArcGIS, offer other methods for scaling the images; however, they are beyond the scope of this book. This book presents methods for scaling images that are not geo-coded, using only Photoshop, CAD, and/or Illustrator. There are three primary methods for scaling images in Photoshop and Illustrator: the Calculator method, the Scale by Reference method, and the Pixel Conversion method.

Calculator Method

The Calculator method uses conversion calculations to determine scale by referencing a known distance on the aerial image. There are simpler, more automated techniques to scale drawings in many software packages. However, this method is extremely useful as a fundamental technique for scaling drawings. It can be used with almost any software package that has a measurement tool. This method can also be used on a stand-alone photocopier or scanner with the ability to scale by percentages.

Similar to the Scale by Reference method, which will be discussed later, the Calculator method requires knowledge of at least one linear distance on the image, such as the length of a building or the distance from one point to another on the site. If this information is not available from a survey of the site, measuring devices are available in Google Earth and other online geography websites to determine a distance. This method is not as accurate as a professionally commissioned survey; but depending on the project, it is typically accurate within an acceptable range for diagrammatic work and creating a base for plan drawings.

The Calculator method relies on finding the difference between the current scale of the drawing and the desired scale of the drawing. That difference is used as a multiplier to scale the drawing. This is a simple example of this method to demonstrate the concept.

If a drawing is at 1 inch to 20 feet (current scale) and the desired scale is 1″ = 10′, the drawing would need to be increased in scale by 2 times, or by 200 percent. In this example, the Scale Factor is 2 and the Scale Percentage is 200. The simple calculation is:

Current Scale / Desired Scale = Scale Factor (multiply by 100 to get Scale Percentage)

The calculation and scaling operation in Photoshop would proceed in this fashion:

1. The current scale of the drawing is 1″ = 20′ or (20).
2. Divide that by the desired scale, which is 1″ = 10′ or (10).
3. The calculation is 20/10 = 2.
4. The scale factor is 2, and the scale percentage is 200.

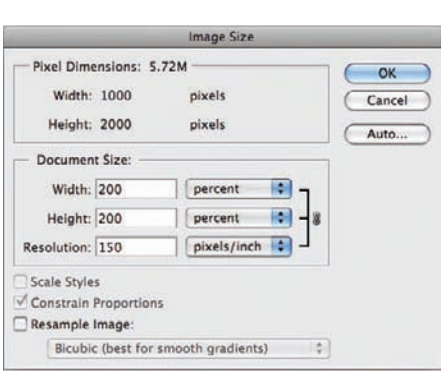


Figure 6.12. The image will be scaled by the percent value in the Image Size dialog box. Uncheck the Resample box to prevent upsampling.

5. To change the scale of the drawing in Photoshop, **select Image > Image Size.**
6. Change the drop-down menu to Percent, and increase the size of the drawing by 200 percent.
7. Make sure the Resample box is unchecked to prevent upsampling.

In practice, the current scale of the aerial image is not usually known. To scale an image that is at an unknown scale, at least one real-world dimension from the site must be determined. This could be the length of a road or the width of a building. Longer dimensions are more likely to result in more accurate scaling than shorter dimensions, because the chance for measurement error increases with shorter distances. This method requires a slightly more complex set of calculations to complete the scaling operation. It basically adds one critical step, determining the current scale of the image. After the current scale is determined, the same calculations used previously are used to find by what percentage the drawing needs to be increased or decreased to reach the desired scale.

The following steps give an example of how to determine the current scale of the drawing:

1. Find a real-world distance measurement to use in the scaling operation. For this example, the length of the site will be the measurement. The length of this site is approximately 3,400′, based on a measurement using Google Earth.
2. Determine the desired scale. For this example, the desired scale is 1″ = 500′ on an 8.5″ × 11 ″ sheet.

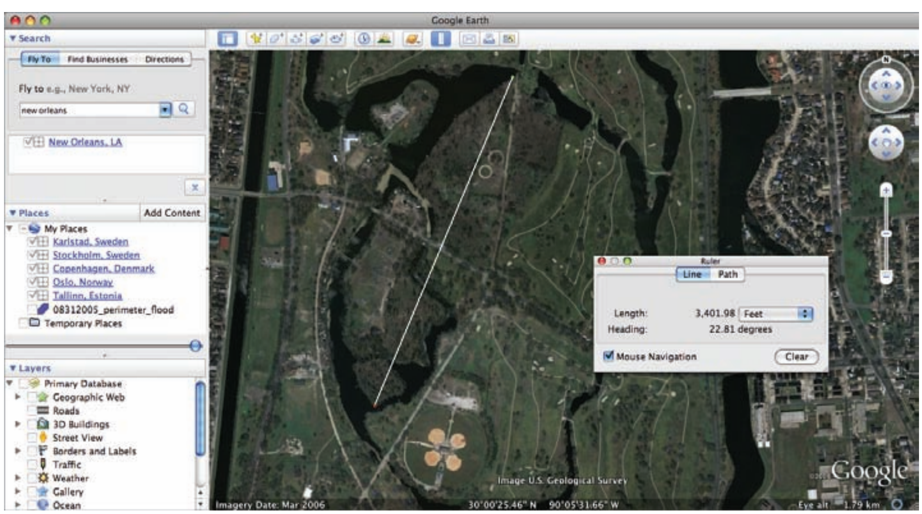


Figure 6.13. Real-world distances can be determined by a number of methods. Surveys, on-site measurements, and online resources are among the many methods for finding measurements. This example shows the measurement obtained using Google Earth.

3. Determine the same distance, which can be referred to as the *image distance*, on the aerial in Photoshop. With the Use Measurement Scale box unchecked, use the Ruler tool to click and drag a measurement over the same distance that was used to determine the real-world distance. In this example, the image distance is approximately 8.5″ long.
4. To determine the current scale of the Photoshop drawing, divide the real-world distance measurement by the image distance. In this example, divide 3,400 by 8.5 to get 400.
5. The current scale of the aerial image is 1″ = 400′. The calculations to convert the image to the desired scale of 1″ = 500′ are the same as in the first simple example. Divide the current scale by the desired scale, or 400/500, which provides a scale factor of .8, or a percentage scale of 80 percent.

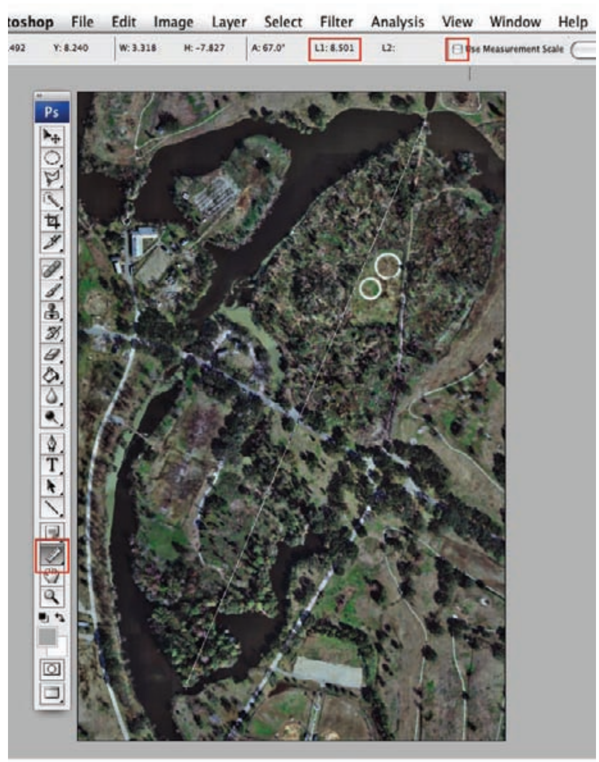


Figure 6.14. Use the Ruler tool to measure the same real-world distance on the aerial image. Uncheck the Use Measurement Scale box.

This technique works the same in Illustrator with two small differences. The Info palette is used to make the measurement of the image distance. An example of the different technique is shown here:

1. Using the Pen tool, draw a line that is the distance to be measured.
2. Select the line and bring the Info palette to the screen **(Window > Info)**.
3. The length of the line will be displayed in the Info palette.
4. To change the scale of the objects in the drawing, select the objects, **select Object > Transform > Scale**, and enter the percentage scale in the dialog box.

Scale by Reference Method

The Scale by Reference method is an automated technique for scaling base material. Similar to the Calculator method, this method assumes that one dimension in the drawing, the real-world distance, is known. The difference is that the software will perform the calculations for you. SketchUp and AutoCAD are two commonly used programs with an automated Scale by Reference method built into the software. Typically, software that draws in "real world" units, such as SketchUp, AutoCAD, and most other 3D modeling packages, will use the Scale by Reference method. We will look at how to scale the image in SketchUp as an example:

1. Import the aerial image and place it on the model.

2. In this example, the real-world distance is the same as in the previous examples, approximately 3,400′.

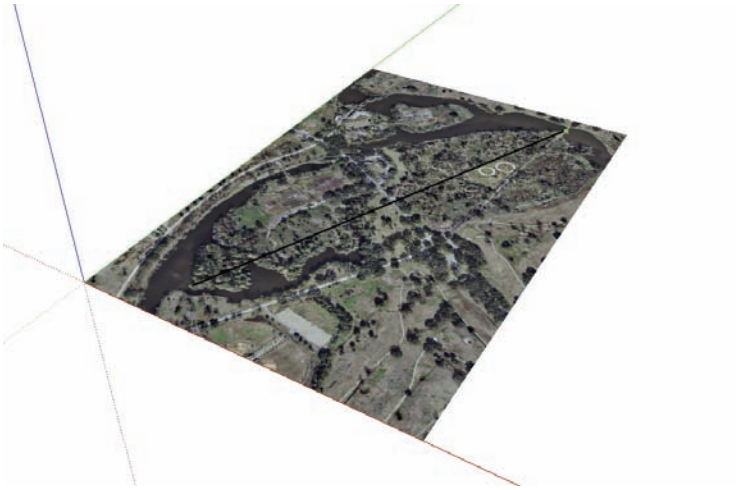


Figure 6.15. Using the Pen tool, draw a line over the known real-world distance. To scale the model, use the Tape Measure tool and click on each endpoint of the line, enter the real-world distance (3,400′), and press Enter.

3. Using the Pencil tool, draw a line over the real-world distance.
4. Using the Tape Measure tool, click on the two endpoints of the line.
5. Type in the new length, the real-world distance (3,400′), and press Enter.

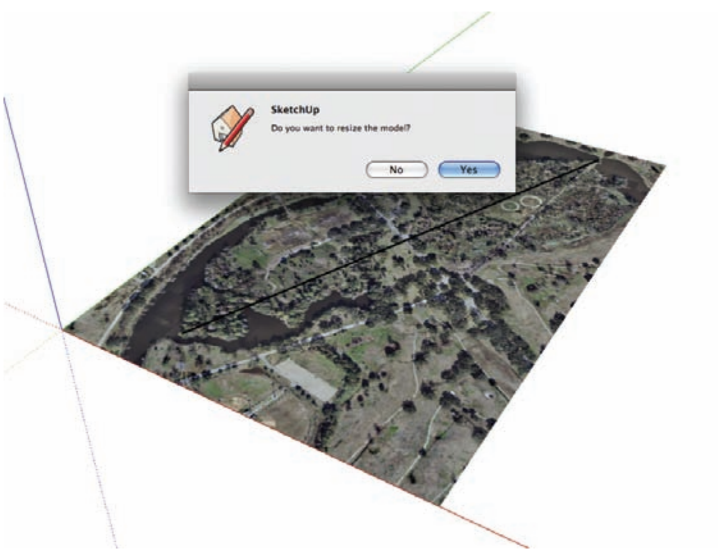


Figure 6.16. After you press Enter, a dialog box confirms the operation. After you accept the transformation, the model will be resized according the reference length.

6. A dialog box will appear to confirm the operation. Click Yes.
7. The software will scale the model to the appropriate size.

Pixel Conversion Method

The third way to obtain the correct scale uses the Pixel Conversion method. To use this method, you need to know the feet/meters-to-pixel ratio of an image before you scale it. This information is predetermined, and sometimes it is located on the documents that are downloaded with the image. Typical resolutions for this method are 1 foot = 1 pixel, 2 feet = 1 pixel, and 1 meter = 1 pixel, although there are many other ratios. The *feet/meter-to-pixel ratio* is the distance represented by one pixel of the image. For example, if the feet per pixel resolution of an image is 1 foot = 1 pixel and the image is 2,000 pixels wide by 1,000 pixels high, the distance across the top of the image is 2,000 feet. If you were to print the drawing at a resolution of 200 pixels per inch, the image would be 20″ wide by 10″ high and the scale would be 1″ = 100′.

Adjusting the Hue, Saturation, and Lightness of Base Imagery

Photoshop is usually used to make adjustments to aerial photographs. A standard technique for adjusting an aerial image is to *desaturate* the image if it is in color. This removes the color from an image, offering more contrast to the linework that is added over the image. A fully desaturated image consists of only shades of gray, plus black and white; however, sometimes a small amount of color is retained, depending on the desired outcome. To desaturate an aerial image using Photoshop, follow these steps:

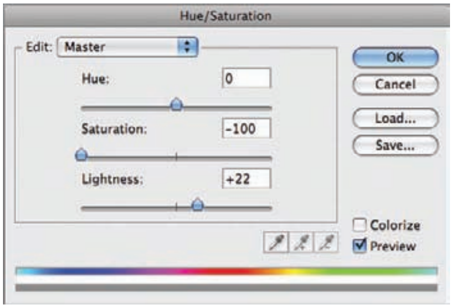


Figure 6.17. Lowering the Saturation to –100 will remove all color from the image.

1. **Go to Image > Adjustments > Hue and Saturation.**
2. The Hue/Saturation dialog box will appear. Lower the Saturation value to desaturate the image. Lowering the Saturation to –100 will create an image with no color.
3. Lowering the Lightness of the image will create a lighter image that often provides better contrast with the linework to be added to the drawing later.

Another technique that achieves the same results, but which is much more flexible in the drawing workflow, is to use an *adjustment layer* to alter the hue and saturation rather than an image adjustment. An adjustment layer offers the same capabilities as an image adjustment, but with the ability to edit the adjustment at any time in the drawing process. Once an image adjustment is completed, the image cannot be reverted to its previous state except through History (or Undo) operations. An adjustment layer resides in the Layers palette and can be adjusted or completely removed at any time. Adjustment layers are saved with the drawing, just like normal layers, so the flexibility to undo or alter the adjustment always exists.

Figure 6.18. Original aerial image in full color.

Figure 6.19. Image with Saturation set to –100.

Figure 6.20. Aerial image lightened to increase contrast with linework to be added later.

Many of the same adjustments can be made in both the **Image > Adjustments menu item and the adjustment layers**.

New adjustment layers can also be created from the Layers palette.

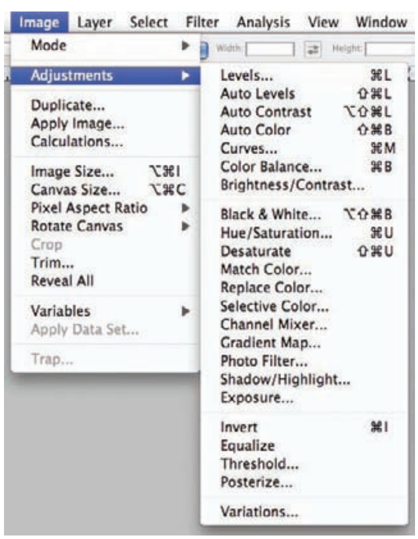


Figure 6.21. The adjustments that are available from the **Image > Adjustments menu** are similar to the adjustments available as adjustment layers.

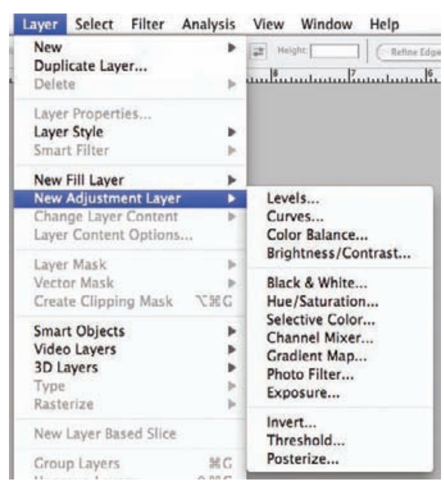


Figure 6.22. Adjustment layers have the added advantage of remaining editable throughout the life of the drawing.

Once a new adjustment layer has been created, the Hue/Saturation dialog box will appear so that adjustments can be made to the image. Once the adjustments have been set, an adjustment layer will appear in the Layers palette. This layer can be turned off or deleted just like other layers.

Figure 6.23. New adjustment layers can be created from the Layers palette.

Figure 6.24. When the adjustment layer is turned off, the adjustment does not affect the image.

Figure 6.25. When the adjustment layer is turned on, the adjustments affect all layers below it in the Layers palette.

To alter the adjustment, double-click on the adjustment layer so that the Hue/Saturation dialog box appears. By altering the values in this dialog box, more adjustments can be made to the image.

The layer order in the adjustment layers affects how an image is adjusted. Adjustment layers affect only the layers that are below them in the Layer palette. If a layer is placed above the adjustment layer, it will not be affected by the adjustment.

If an adjustment layer is placed above another layer, the adjustment will affect that layer.

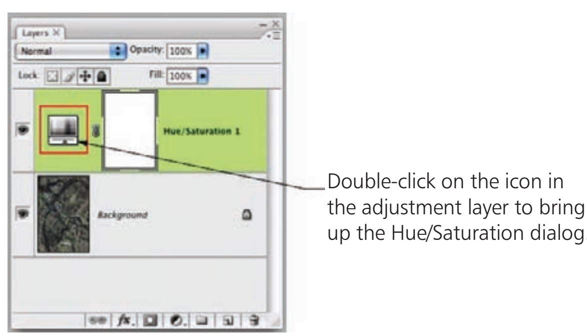


Figure 6.26. To make more adjustments, double-click the icon in the adjustment layer so that the dialog box will reappear.

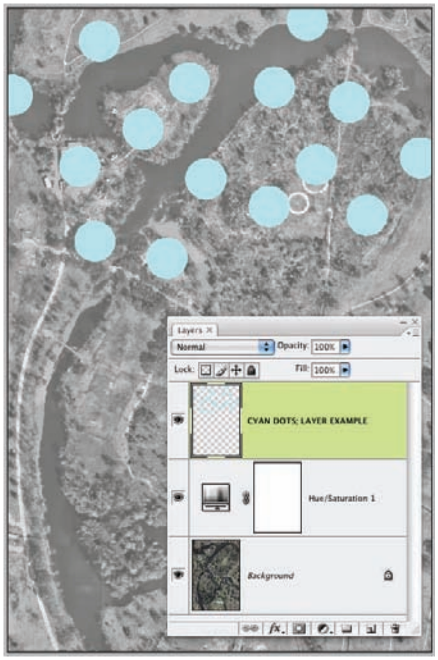


Figure 6.27. The adjustment layer affects only the layers below it in the Layers palette.

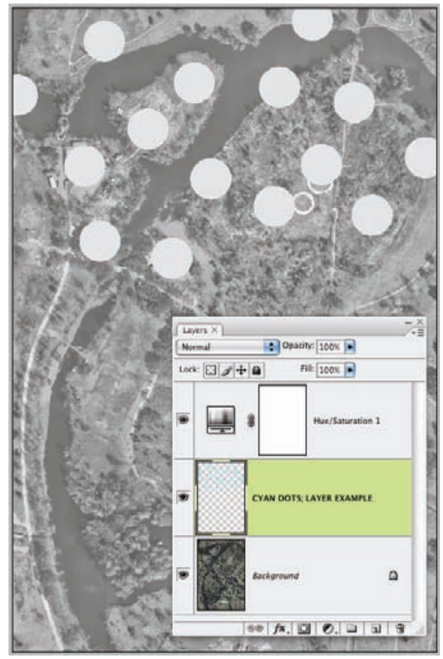


Figure 6.28. If the Cyan Dots layer is moved below the Hue/Saturation layer, it will be affected by the Hue/Saturation adjustment.

Figure 6.29. Select the areas that will be used for the mask. When a new adjustment layer is created, the selected areas are automatically converted to a mask and used in the adjustment layer.

Adjustment layers can also be used with a *mask* so that only a portion of an image is affected on the layers below it in the Layers palette. *Masking* is a powerful concept in Photoshop, and mastering the use of masks will increase your efficiency with Photoshop. A more detailed explanation of masks is found on page 177. The technique used here uses masks in combination with adjustment layers to desaturate a portion of the image while the remainder of the image remains in color.

1. Create a selection around the area that will remain in color.
2. Invert the selection using **Select > Invert**.
3. With the selection active, create a new Hue/Saturation Adjustment layer.
4. The new adjustment layer will automatically have a mask attached to the layer. The outline of the selection will be visible in the Mask icon on the adjustment layer. The areas in white on the mask will be affected by the Hue/Saturation adjustment, while the areas in black are masked.
5. When the Hue/Saturation is adjusted, only the areas of the image that are not masked are affected.

Using CAD Linework as a Base

Existing CAD linework can also serve as a context base for projects. The CAD linework can be used alone or combined with an aerial image to create the base. This section presents a simple technique for importing CAD linework into Photoshop as a base for diagrams, as well as techniques for altering the color of the linework and the background. Using CAD linework as the basis for a plan rendering is discussed in detail in Chapter 17.

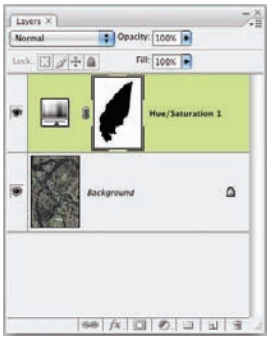


Figure 6.30. The Mask icon shows the areas where the adjustments will be masked. Areas that are white will be adjusted; the areas in black will be masked from the adjustment.

Exporting the CAD Linework as a PDF

The linework should be set up in AutoCAD to be printed at the scale and paper size required for the final image. If the desired size/scale of the printed image is 24″ × 36″ at 1″ = 100′, a Paper Space tab with the correct paper size, scale, and lineweights should be created in AutoCAD. This Paper Space tab should then be printed or exported as a PDF to be imported into Photoshop. For a more detailed discussion of this technique, see Chapter 17.

Importing the Linework into Photoshop

The advantage of importing the linework into Photoshop is that it gives you the opportunity to use the image-adjustment tools. Several different techniques can be used to change the appearance of the linework, including adjusting the color and transparency of the lines. If the linework is too light, it can be copied in place to make the linework darker. To copy the linework in place, simply drag the linework layer and drop it on the New Layer icon on the Layers palette. If the linework is too dark, the brightness can be adjusted using **the Image > Adjustment > Contrast and Brightness command**. The lines can be changed to white using **the Image > Adjustments > Invert command**. The following is an example of how to alter the linework in Photoshop:

Figure 6.31. The adjustment layer does not affect the area that is masked.

1. Import the PDF created from the AutoCAD linework by opening the PDF directly in Photoshop. A dialog box will offer several choices for importing the PDF. Choose Bleed Box for the Crop To: option. The Image Size should be the same size as the page size created in the Paper Space tab in AutoCAD. Photoshop will rasterize the vector-based PDF linework at the Resolution selected in the dialog box. The resulting file in Photoshop will be the same size/scale as the Paper Space tab created in AutoCAD.

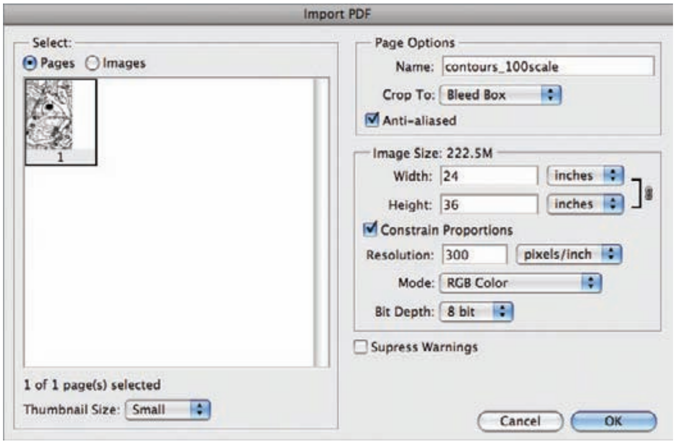


Figure 6.32. Open a PDF printed from AutoCAD directly in Photoshop. The Import PDF dialog box provides options for rasterizing the PDF. Choose Bleed Box to preserve the scale of the PDF.

2. The PDF will typically import with a transparent background. To create a solid color for the background of the image, create a Solid Color adjustment layer. The Color Picker will open to allow any color to be chosen as a background.

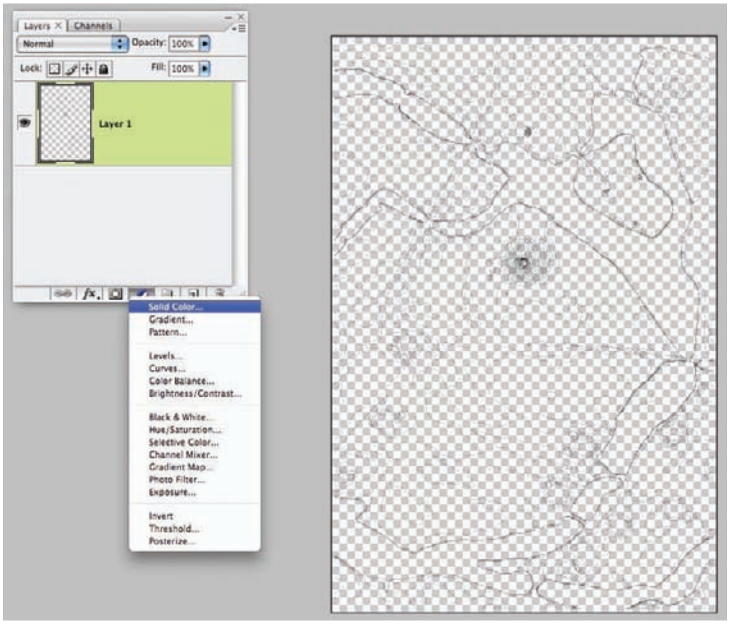


Figure 6.33. The Solid Color adjustment layer can be selected from the New Fill Layer menu.

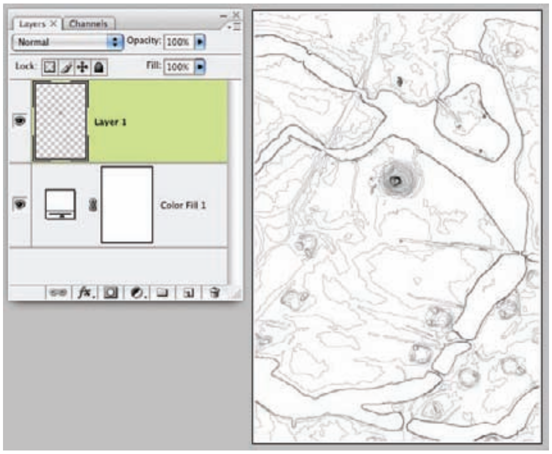


Figure 6.34. When the CAD linework is set up on one layer and a Solid Color adjustment layer is below it, many options are available for altering the appearance of the linework and background color.

3. This setup offers several alternatives for the appearance of the linework and image background. To create a black background with white linework, double-click the Solid Color Adjustment Layer icon and choose black as the background color from the Color Picker. To create white lines, select the linework layer and choose **Image > Adjustment > Invert**.

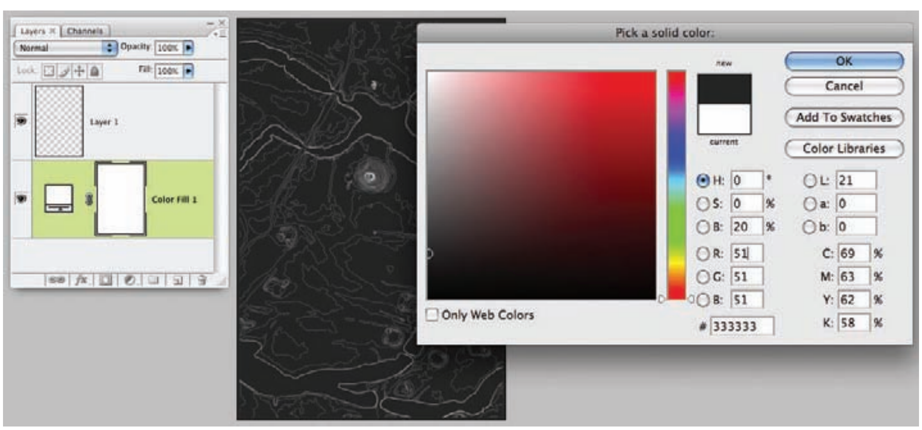


Figure 6.35. Double-click the Solid Color Adjustment Layer icon to recall the Color Picker. Any color can be chosen for the background and adjusted at a later time.

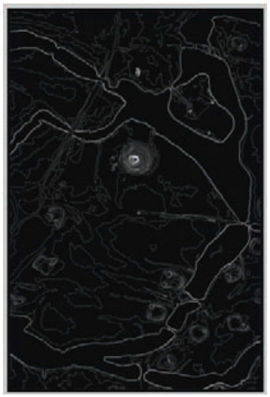


Figure 6.36. Select the layer with the linework and **then choose Image > Adjustments > Inverse** to change the black lines to white. Another technique is to use **the Image > Adjustments > Brightness/Contrast dialog box** to adjust the value of the lines.

4. Another technique that is possible with this setup is to create a colored background with colored linework. In this example, a sepia background with sepia linework is created by again altering the Solid Color adjustment layer as in steps 1–3.
5. To create the colored lines. Cmd/Ctrl+click the icon in linework layer to select all of the pixels on that layer. Create a new layer and hide the original linework layer. Select the color for the new linework using the Color Picker. Using the Paint Bucket tool, uncheck the Contiguous and Sample All Layers box in the options bar at the top of the screen, and click inside the selected area in the drawing. For more information on using the Paint Bucket tool, see Chapter 18.

Chapter 7
Hand-Drawn Linework

In order to facilitate the integration of analog and digital representations, the designer needs to have methods for incorporating hand-drawn elements into digital renderings. A range of hand-based techniques—from quick sketches to precisely drafted pen and ink drawings—is available. The methods used to incorporate these drawings into digital work vary greatly, depending on the desired result. If the hand-drawn linework is to be used as a base for tracing in AutoCAD, the main criteria would be that the drawing is measured and drawn to a scale. At minimum, the elements in the drawing need to be proportional to one another. This is required so the base drawing can be set up in order to transcribe the information into accurate CAD linework.

If the hand-drawn linework is to be used in Photoshop, the linework usually needs to be extracted from the background (paper). If the drawing is accurate and clean, separating the darker linework from the lighter paper is much easier. Removing a drawing from the background is much more difficult if there is a great deal of variation in shading and tone in the linework, and areas that are very light may get lost in the extraction. Retouching the hand-drawn linework to make it crisp and accurate before you scan it can sometimes make the process of extraction easier.

Sketches in CAD

For many projects, the base material will start with a hand-drawn sketch. The sketch, scanned and saved as a JPG file, will become a base for CAD drawings or a 3D model. If the sketch is too large for the scanner, it may need to be scanned in several pieces and tiled together in Photoshop. See page 47 for descriptions of how to tile and scale an existing image. If the hand-drawn sketch is to be traced in a CAD or 3D modeling program, there is little that needs to be done to prepare the drawing after tiling and scaling have been completed. See page 51 for a technique that can be used to scale the drawing in AutoCAD using the Scale by Reference method. If the image is too large, it may slow down the CAD software. If that is the case, the size of the file can be reduced in Photoshop and reimported into AutoCAD to allow the software to operate more smoothly. Because this depends on the CAD software and type of machine running the software, it is best to experiment to find a resolution that provides enough detail to use for tracing while allowing for smooth panning and navigation.

A hand-drawn sketch can also be used as linework that is colored in Photoshop.

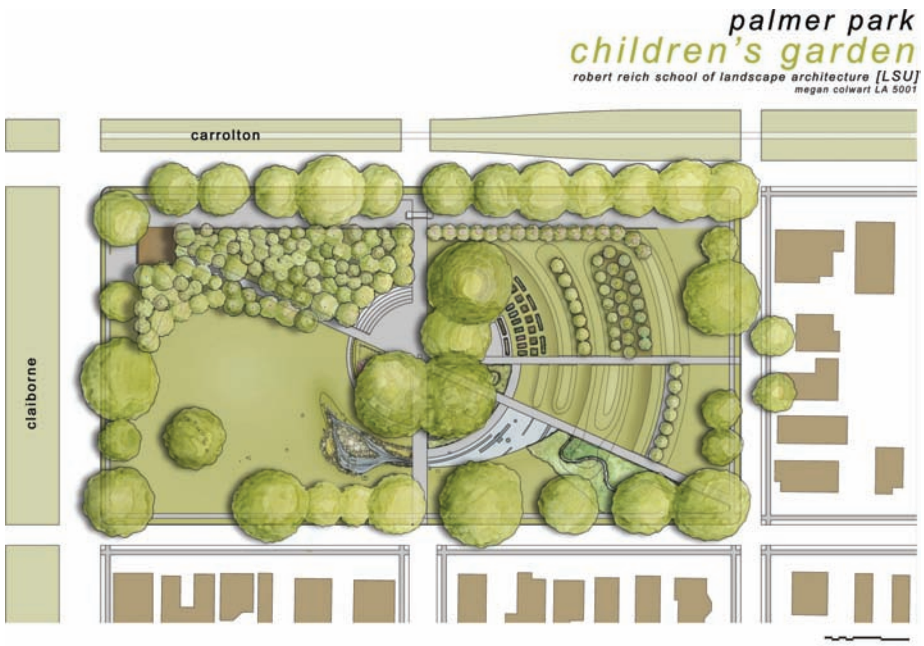


Figure 7.1. This image combines hand-drawn elements with a CAD base. The hand-drawn trees and portions of the ground plane were drawn on a printed CAD base and then scanned and imported into Photoshop for rendering.

This technique is particularly effective for rendering color quickly on progress drawings for client meetings or interim pinups. It can save a significant amount of time as opposed to hand coloring the drawing or, alternatively, re-creating the linework in a CAD application.

To use this technique for quick renderings, the linework needs to be separated from the *whitespace* (blank area) of the paper on which it was drawn. In some cases, where only a very rough sketch is needed, the background may not need to be separated from the linework. For a drawing that requires sharp linework, however, the color needs to be on a layer below the linework. Otherwise, the color will bleed into the edges of the linework and distort the quality of the line.

Using Magic Wand and Color Range Selections

To separate the linework from the white background, you can start with either a Magic Wand or a Color Range selection. The Magic Wand and the Color Range selections work in similar ways, but understanding the difference between these two methods is critical for creating a selection. The differences between the Magic Wand tool and the Color Range tool are exploited in many of the techniques covered in this book. It is worth the effort to study the tools and understand the advantages of using a particular tool.

Similarities between Magic Wand and Color Range Selections

The methods used to make selections with the Magic Wand and Color Range tools are very similar. Both tools allow the user to select a *sample color*, and based on that sample color, the software selects other pixels in the image that are similar in color. Following is an example of the basic operation of both selection methods:

1. To select all of the color orange in an image, use the Magic Wand tool and click in an area of the image that is orange. The color selected represents the sample color.
2. Colors similar to the sample color are included in the selection.
3. To make roughly the same selection using the Color Range selection, open the Color Range dialog from the **Select > Color Range menu**.

Figure 7.2. The Magic Wand tool will select colors similar to the sample color selected from the image.

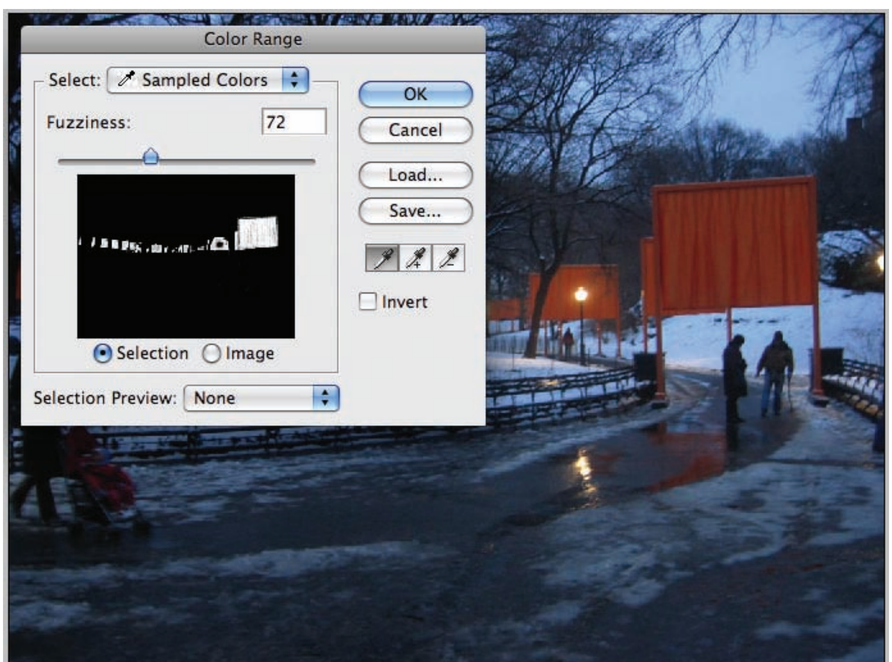


Figure 7.4. Similar to the Magic Wand tool, Color Range selects colors similar to the sample color selected in the image. The dialog box shows the selection as a mask. The areas that are white on the mask are selected; the areas in black are masked.

Figure 7.3. The Color Range dialog box is invoked from the menu bar.

Both selection methods have an option to determine how similar a color in the drawing must be to the sample color to be included in the selection. In the Magic Wand tool, it is called the Tolerance. In Color Range, it is called the Fuzziness. For example, if both Tolerance and Fuzziness were set to their lowest values, only other pixels with exactly the same color as the sample color would be selected. The greater the Tolerance/Fuzziness, the wider the latitude for colors that are included in the selection. For example, with a sample color of orange and a low Tolerance/Fuzziness, only pixels that are very close to orange would be selected. With the Tolerance/Fuzziness set high, reds and yellows would also be included in the selection. Under close inspection of the pixels in a raster image, what is casually called "orange" is actually a range of colors.

Figure 7.5. Upon close inspection, the color of the pixels that make up "orange" are really many different colors. To include all of these colors in a selection, the Tolerance/Fuzziness is adjusted.

There are darker and lighter shades of orange; these are called different *values* of the color. Some colors of orange are more yellow, some are redder; this is a difference in *hue.* Tolerance/Fuzziness is the method these tools use to include a variety of pixel colors in a selection that is generally called "orange."

Differences between Magic Wand and Color Range Selections

A key difference between Magic Wand and Color Range is the ability to select a contiguous range of colors. The Magic Wand has an option to select colors that are all connected to the sample color picked from the image. This option allows bounded areas to be selected within the image. The Color Range tool, however, cannot easily select a contiguous set of pixels.

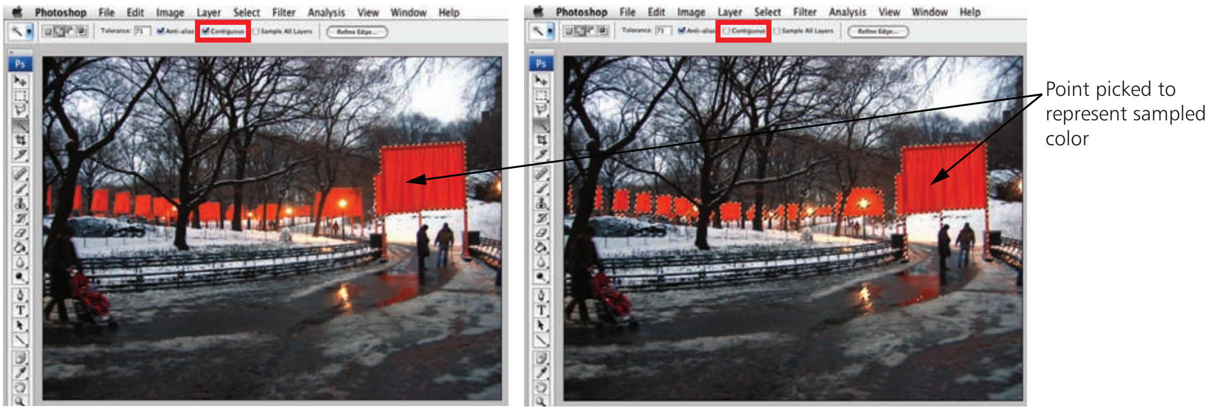


Figure 7.6. The first point selected to be the sample color determines the origin of the contiguous selection. From that point, the software analyzes the pixels immediately adjacent to the sample color point. If some of those pixels are similar in color, the selection analyzes those pixels for similar adjacent pixels and so on, until a boundary is found for the selection.

Another major difference is the Sample All Layers option on the Magic Wand tool. This allows the Magic Wand tool to use the pixels on a single layer for the selection. By unselecting Sample All Layers, the Magic Wand will consider only the current layer in the selection. This can be accomplished using the Color Range selection, but it requires that all layers not needed for the selection be hidden. This is extremely cumbersome if the drawing contains more than a few layers.

In most instances, the Magic Wand tool is the preferred selection tool of this type. It offers more flexibility and is more intuitive to use. However, when fine selections (such as separating hand-drawn linework from the background) are being made, the Color Range selection offers a better result than the Magic Wand tool. The difference in this instance is how they define that boundary between the selected and nonselected colors. With either tool, you can adjust the range of colors that are included in the selection by adjusting the tolerance or fuzziness. The major difference is that the Magic Wand selects the "entire" pixel if it falls within the Tolerance range. Color Range, however, can select a percent of a pixel. It can be thought of as selecting a partially "transparent" pixel. The details of how pixels can be partially selected are covered on page 184.

Using the Color Range Selection Tool

A close examination of a raster-based line in a hand-drawn sketch reveals that the "black" line is actually made up of a range of colors, mostly grays, from white to black.

These shades of gray create the illusion of a sharp edge to the line. Without these shades of gray along the edge of the line, the line would look jagged.

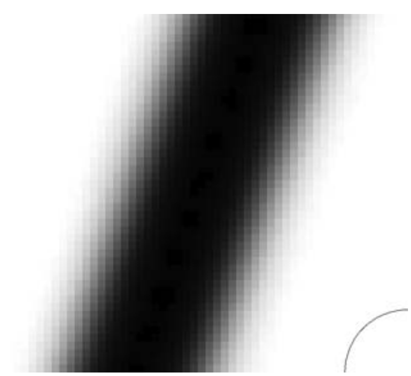


Figure 7.7. A raster-based line is composed of several shades of color. This creates the illusion of a smooth edge to the line.

Figure 7.8. The line on the left does not have the shades of gray along the edge to create the smoothing appearance. The line on the right will appear smooth and crisp at normal resolution. This example is enlarged to show the detail of the line.

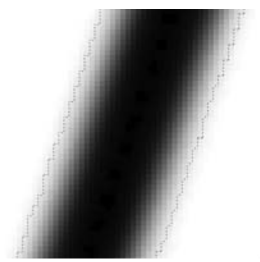


Figure 7.9. Using the Magic Wand tool, you can select all of the gray pixels that make up the edge of the line.

These gray pixels are the ones that maintain the smooth appearance of the line after the white background is removed.

The Magic Wand tool can select these gray pixels fairly well if the Tolerance is adjusted properly. However, the Magic Wand selects the entire pixel.

Because the Magic Wand fully selects each pixel, when the line is placed on a different color background, the gray and white pixels will create a white glow around the line.

A Color Range selection will select the black pixels as they turn gray in a similar way to the Magic Wand tool. However, as the pixels get nearer the edge of the Fuzziness limit, the pixels are only partially selected. The pixels on the edge of the selection are partially transparent. When a line selected using Color Range is placed on a red background, the result is a blending of the new background color with the pixels from the line.

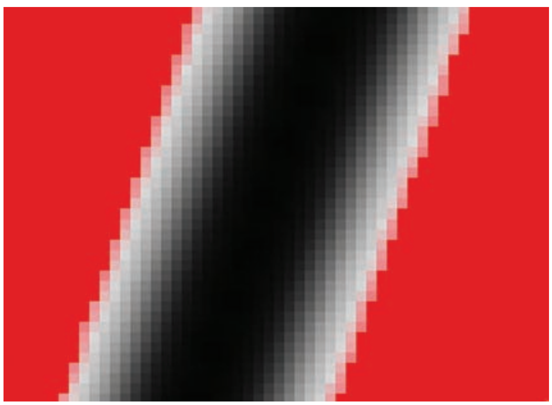


Figure 7.10. The Magic Wand tool selected all of the gray and white pixels along the edge of the line. When placed on top of a different color background, the gray and white pixels create a white glow around the line.

Figure 7.11. The outer pixels in a Color Range selection are only partially selected. This allows the pixels to blend with a new background color.

Selecting Linework from a White Background

As seen from the previous discussion, it is preferable to use a Color Range selection for separating hand-drawn linework from a white background. Using a Color Range selection will also preserve the variations in tone present in most hand-drawn sketches. The process for making a Color Range selection is described in the preceding text. Once that process is understood, the technique for separating linework from the background is fairly straightforward. The following is an example of how the process would be completed:

1. Scan a hand-drawn sketch. If the linework is not colored, scan the image as a grayscale image. This is not critical, but it will slightly improve the accuracy of the Color Range selection by reducing noise from the scanner. Occasionally the scanner will impart a slight hue on the edges of linework, and scanning in grayscale prevents this error.
2. Open the scan in Photoshop. Change the color mode from grayscale to RGB by choosing **Image > Mode > RGB Color**, unless the drawing is going to be monochromatic. The scanned image will be on the background layer, which is usually locked by default. To unlock the background layer, double-click on the layer in the Layers palette. Rename the layer.
3. Zoom into a section of the drawing that has the widest variety of shades, from very dark to very light. Open the Color Range dialog from **Select > Color Range**. Using the Eyedropper, select the darkest area of the linework.
4. Adjust the Fuzziness until the linework appears in the preview box in the dialog.
5. Click OK to accept the selection.
6. Cut the linework and place it on a new layer by **selecting Layer > New > Layer via Cut**.

Chapter 8
Source Imagery/Entourage

Compiling a collection of people, plants, and textures to populate your drawings is an important element of successful drawings. These elements that are put into a drawing are often called the *entourage* of the drawing: the surrounding elements that add to the overall image. The difference between drawings that look pasted together and ones that accurately express the design idea often comes down to the quality of the entourage.

There are two main ways to obtain your entourage: make it yourself or purchase it. For some applications, purchased entourage is acceptable. Good collections of people and cars that fit most situations are available. However, it is important to understand how to create your own entourage, as most premade plant images look too much like brand-new nursery stock trees to create evocative sections and perspectives. Collecting images of vegetation from the actual site of a project for use in the drawings is the preferred method.

Figure 8.1. Most of the trees for this image were created from images of trees on the actual site. Finding premade images of trees that express the character of the planting design is difficult.

Frequently, unique elements that cannot be purchased are needed for an image—for example, a monument on the site or a bridge in the background. Although such elements are not strictly considered entourage, the same techniques are used to separate them from their backgrounds.

Selections

Understanding how to make selections is one of key skills when working with raster images. Separating one set of pixels (for example, the pixels that create the image of a tree) from another set of pixels (everything else in the image) requires an understanding

of the different tools Photoshop uses to select pixels. There are two basic ways to make selections in Photoshop: by hand and by pixel. The By Hand method uses the mouse to directly select the pixels. The By Pixel method uses the color or value of the pixels to make selections. The two most common tools used for the By Hand method are the Marquee tool and the Lasso tool. The two most common tools used for the By Pixel method are the Magic Wand tool and the Color Range selection. The basics of these two tools were covered on pages 63–67. The following text shows some techniques that use these tools to select entourage for use in design drawings.

Manual Methods

There are several manual methods for selecting pixels. The simplest is to use the common Marquee tool. To use this tool to select pixels, click the mouse and drag a box over the pixels to be included in the selection. A similar, but more nimble selection tool is the Lasso tool. This tool draws a freeform shape with the mouse around the pixels required for the selection. The Polygonal Lasso works in much the same way, but clicking from point to point around the pixels makes the selection. In all three of these selection methods, the pixels are either inside the selection or outside the selection. Each pixel is 100 percent selected or 0 percent selected. There are other selection methods that allow a pixel to be "partially selected." Understanding how to use partial selections is key to a number of techniques used in the book.

Partial Selections

Pixels in Photoshop can be partially selected. This is a very powerful concept in Photoshop, and understanding it is critical to making advanced selections. Most people are familiar with the *marching ants* selection box in Photoshop.

In this type of selection, the pixels inside the box are selected, while pixels outside the box are not. There are no partially selected pixels in a standard Marquee selection. To see the difference between a *fully selected* pixel and a *partially selected* pixel, consider the following example:

1. In a blank 500 × 500 pixel document, make a selection using the Rectangular Marquee tool.

Marching Ants (also seen in Figures 8.3, 8.4, 8.6, 8.9, 8.13, 8.18, 8.19, and 8.30).

Figure 8.2. To select pixels using the Rectangular Marquee tool, click and drag over the pixels to be included in the selection.

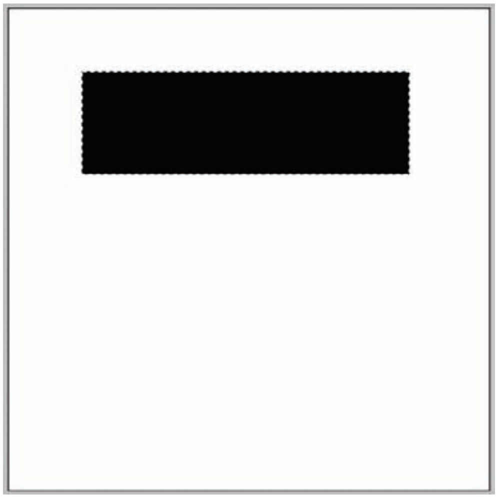


Figure 8.3. A standard selection with the Rectangular Marquee tool accepts color from the Paint Brush tool within the entire selection. All pixels are fully selected.

2. Using the Paint Brush tool, paint a color over the selection. All of the pixels inside the selection are painted 100 percent black, and none of the pixels outside the selection receive any paint at all.
3. Make another selection using the Rectangular Marquee tool.
4. From the menu, choose **Select > Modify > Feather**. Choose 10 as the number of pixels to feather the selection. Feather will create a series of partially selected pixels at the edge of the selection. In practice, this is used to create selections that blend with other parts of a drawing. For this exercise, it will simply serve to demonstrate the effect of a partially selected pixel.
5. Paint a color over the new selection. The pixels at the edge of the selection, where the feather was applied, accept only a portion of the paint from the Paint Brush tool. These pixels are selected, because they accept paint from the Paint Brush tool, but obviously they are not fully selected.

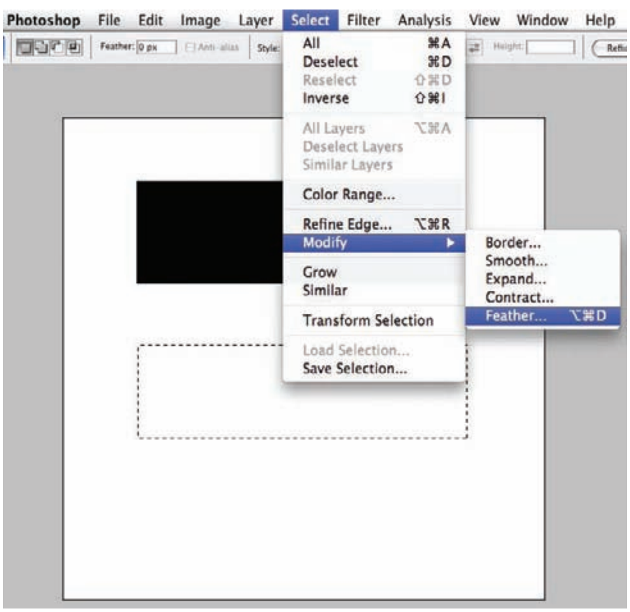


Figure 8.4. To create a series of partially selected pixels along the edge of a standard Marquee selection, choose the Feather option. This will make a gradient of partially selected pixels along the edge of the selection.

Figure 8.5. When color is applied over the feathered selection, the effects of partially selected pixels are apparent. Where fully selected pixels receive all of the paint and unselected pixels receive no paint, partially selected pixels receive a percentage of the paint according to the percentage of the pixel that is selected. For example, a 50 percent selected pixel would be 50 percent gray if painted over with a black brush.

Masks

To understand how partial selections work, it helps to understand the concept of *masks.* Masks are simply a different way of seeing a selection. Consider the following analogy using a printed photograph and a piece of cardboard (or a mask). Imagine that the piece of cardboard is taped over the photograph. A hole is cut in the piece of cardboard to make visible a portion of the photograph. Cutting a hole in the cardboard, or the mask, is the equivalent of making a Marquee selection. If a paintbrush is used to cover the image, the paint will affect the image only in the areas where the cardboard has been cut away. On the other parts of the image, the cardboard would *mask* the image.

Photoshop provides a simple way to view selections as masks instead of as standard selections, which is what the marching ants selections are called. Quick Mask mode is used to see the selection as a mask. Switching to Quick Mask mode does not alter the selection; it simply provides another way of viewing the same selection. To see how to switch between Standard Selection mode and Quick Mask mode in Photoshop, consider the following example:

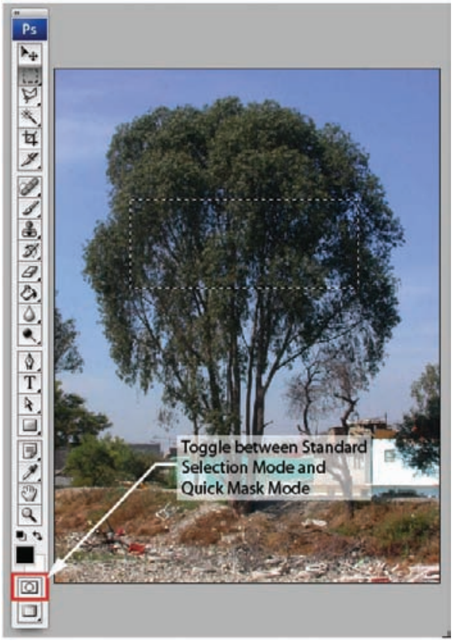


Figure 8.6. Clicking the Quick Mask icon toggles back and forth between Standard Selection mode and Quick Mask mode.

1. To switch back and forth between Standard Selection mode and Quick Mask mode, click the Quick Mask icon in the Tools palette. If the Quick Mask icon is clicked again, the view toggles back to Standard Selection mode. Switching back and forth between the two views does not affect the selection itself. It is simply two different ways of looking at the same selection. However, to work on an image, the document must be in Standard Selection mode. As explained later in this section, if a change is made while in Quick Mask mode (for example, when using the Paint Brush tool), the mask will be altered, not the image.
2. In Quick Mask mode, the selection is represented as a colored area for the masked areas (in this example, the areas in black) and an open area that shows the image below for the selected area. In terms of the previous analogy, the black area is the "cardboard" covering the image, and the clear area is the portion of the mask that is cut away.
3. To make Quick Mask mode easier to use, Photoshop has provided a method to control the appearance of the mask. When the Quick Mask mode icon in the Tools palette is double-clicked, a dialog box appears that adjusts the colors of the mask. It is important to understand that the color or transparency of the "view" of the mask does not affect the mask itself. In this example, the mask has been colored

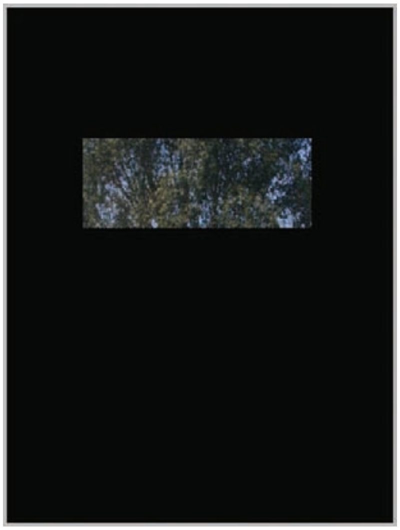


Figure 8.7. In Quick Mask mode, the covered areas represent the masked areas, and the areas that are open to the image below represent the selection.

Figure 8.9. Create a selection using the Rectangle Marquee tool.

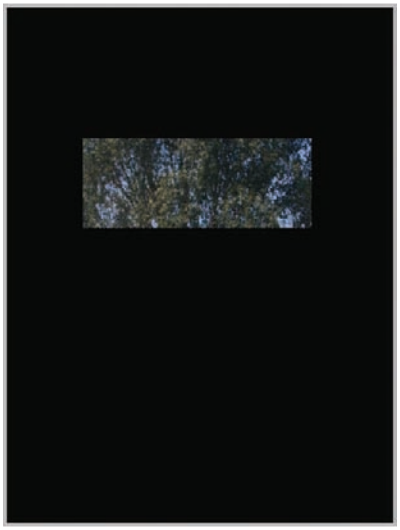


Figure 8.10. In Quick Mask mode, the area of the selection should be clear and the masked area should be a color.

black and the Opacity set to 100 percent. This more accurately represents how the mask operates and it useful for this demonstration. However, in practice it is usually easier to use the Quick Mask mode if the image below is visible, even in areas where it is completely covered by the mask. For that reason, Photoshop provides a way to alter the appearance of the Quick Mask mode.

Although adjusting the appearance of the Quick Mask does not affect the selection, the selection can be altered using Quick Mask. This is really the main reason Photoshop includes a Quick Mask mode. Quick Mask mode can be used to paint selections onto the mask. While in Quick Mask mode, painting with white removes the mask and painting with black restores the mask. To revisit the photograph/cardboard analogy, in Quick Mask mode painting with white is similar to cutting away a part of the cardboard to reveal the photograph underneath; and painting with black puts the cut-away cardboard pieces back on top of the photograph. Here's another way to think about altering masks: painting with white in Quick Mask mode selects pixels and painting with black deselects pixels. To see how this operates within Photoshop, consider the following example:

1. Open an image in Photoshop and make a selection using the Marquee tool. This Marquee selection is just to aid in the demonstration of the concept.
2. Switch to Quick Mask mode. If the covered areas in Quick Mask mode are not black, double-click the Quick Mask mode icon to change the appearance of the Quick Mask. For this demonstration, these settings have been chosen because masks are most often represented as a black, white, and gray image in other areas of Photoshop.
3. Notice that the colors in the Color Picker have changed to grayscale colors. This is because only grayscale colors are typically used to alter the mask. To alter the selection, choose white as the foreground color, select the Paint Brush tool, and paint an area of the mask white. The area that is painted white will reveal the image below the mask.
4. The area painted white has been removed from the mask—or put another way, the area painted white has been selected. To see the selection, click the Quick Mask mode icon to switch back to Standard Selection mode. The area that was painted white shows as a selection in this view.

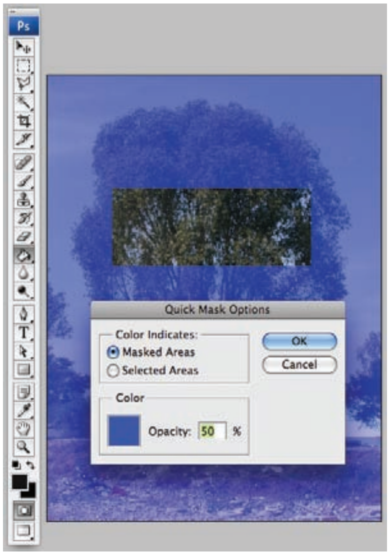


Figure 8.11. To see how quick masks operate, change the appearance of the mask to black at 100 percent opacity rather than the default color of blue at 50 percent opacity. To change this setting, double-click the Quick Mask icon in the Tools palette.

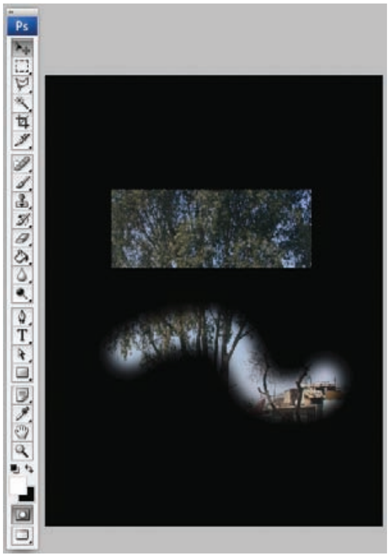


Figure 8.12. Painting the mask white removes the mask or selects the pixels. Painting the mask black restores the mask or deselects the pixels.

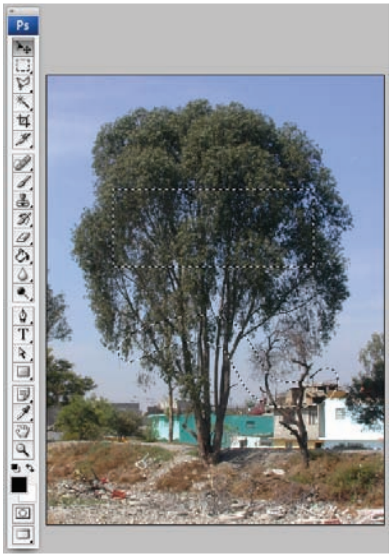


Figure 8.13. Areas that were painted white in Quick Mask mode appear as selections in Standard Selection mode.

Up to this point in the examples, the Quick Mask has allowed only two types of selections for the pixels below: completely deselected or completely selected. The mask has either black or white. In terms of the analogy used earlier, the cardboard is either covering the image or it is not there at all. Imagine that the cardboard covering the image could let some of the paint through and keep some out. The cardboard is really more like a screen than a solid cardboard. Where the screen has larger holes, more of the paint gets through; where the screen has smaller holes, less of the paint gets through. The screen can still be completely open to allow all the paint through or closed to completely block all paint from affecting the image below. The area where the screen is partially open represents partially selected pixels in Photoshop. In a mask, these areas are represented by shades of gray. If a completely covered area is represented as black, and a completely open (or selected) area is represented as white, a partially selected pixel is represented as a shade of gray. The lighter the gray, the "more selected" the pixel. Darker grays will allow less paint through to the image below, lighter grays will allow more.

To partially select a pixel in Quick Mask mode, consider the following example:

5. Starting where the previous example left off, click the Quick Mask icon in the Tools palette to return to Quick Mask mode.
6. Choose the Paint Brush tool and click on the Color Picker. Choose a shade of gray from the top half of the grayscale, a lighter gray.

7. Paint an area of the mask this shade of gray. At this point, the paint is affecting only the mask, not the image below.
8. Return to the Color Picker and choose a shade of gray from the lower half of the grayscale.
9. Paint an area of the mask this darker shade of gray.

Shades of gray greater than 50% show up in the Standard Selection

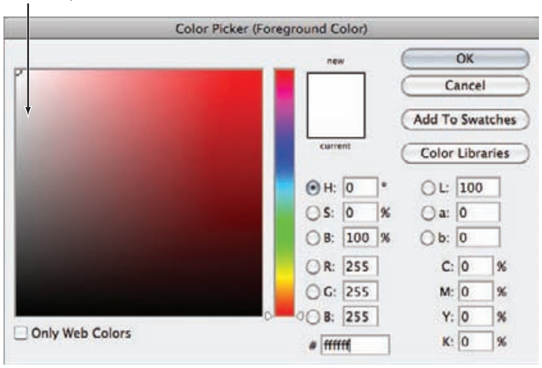


Figure 8.14. Painting a shade of gray on the mask that is more than 50 percent white will show up in the Standard Selection mode.

Figure 8.15. The circle in the top-right corner was painted with a light shade of gray.

Shades of gray darker than 50% do not show up in the Standard Selection

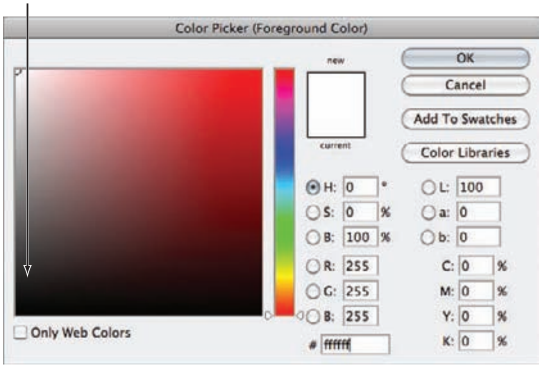


Figure 8.16. Shades of gray more than 50 percent black will not show up in Standard Selection mode. However, these pixels are still partially selected, even if they do not have the "marching ants" surrounding them.

Figure 8.17. The circle in the lower-left corner is painted with a dark shade of gray. This selection will not show up in Standard Selection mode, but these pixels are still partially selected.

10. Switch back to Standard Selection mode by clicking the Quick Mask icon in the Tools palette to see the results. Notice that the area in the upper-right corner that was painted with the lighter shade of gray has marching ants around it, while the other area in the lower-left corner does not. This is because in Standard Selection mode, the marching ants highlight only areas of the drawing that are more than 50 percent selected. An area painted a darker gray will not show up in Standard Selection mode. However, this does not mean these pixels are not partially selected.
11. While in Standard Selection mode, choose the Paint Brush tool and choose red as the foreground color. Paint over the entire drawing. The area painted dark gray in Quick Mask mode allows some of the paint to come through, even though it does not have marching ants around it. In the rest of the drawing, you can see the areas that are completely masked and allow no paint to pass. Areas that are partially masked allow some of the paint through.

Figure 8.18. The areas of the mask that are painted with a light gray show up in the Standard Selection mode; those that are painted with dark gray do not.

The concepts of masks and partial selections are fundamental to many advanced techniques in Photoshop. The previous examples are intended to demonstrate the concept. Examples of techniques that use these concepts will be demonstrated throughout the book.

Creating Entourage

Understanding the advanced selection tools introduced on pages 63–67 and the concept of masks presented in this section will increase your ability to create advanced entourage selections. However, not all entourages need to use these advanced selection techniques. The simplest way to create entourage is to use the Lasso tool to trace an outline around the entourage element. This technique requires some patience, and the results are often a bit choppy. This is fine if the images are meant for the background or will be mixed in with other images, such as in a forest.

If you are going to use the image in the foreground, it is often better to use a more advanced technique than the Lasso tool. Advanced selections rarely use only one tool, however. It is better to use the Magic Wand or Color Range selections in areas where there are small, dispersed pixels, such as the edge of a tree, and the Lasso tool where the outline is easy to distinguish, such as the trunk of a tree. In the following example, the Lasso tool is used in areas that do not have enough contrast to use the Magic Wand or Color Selection tools. Consider the following example that uses both the By Pixel and By Hand methods for selection:

Figure 8.19. Painting over the entire image shows that selected areas that were painted dark gray in Quick Mask mode, but do not appear in Standard Selection mode, will still accept some of the paint from the Paint Brush tool.

1. To select the tree from the background for use as entourage, choose the proper method for selection. The distributed or "fuzzy" portion

of the image, the area with the canopy, is against a solid background. This will make it easier to select this part of the tree using one of the By Pixel methods (see pages 63–67). The lower portion of the image, where the ground plane has a color similar to the trunk of the tree, will require a By Hand method for selection.

2. Using the Color Range Selection tool, select the middle of the blue sky. In this example, the Fuzziness is set very high, at 171. There are many areas of gray in the selection, especially in the canopy of the tree. These gray areas are partially selected pixels.

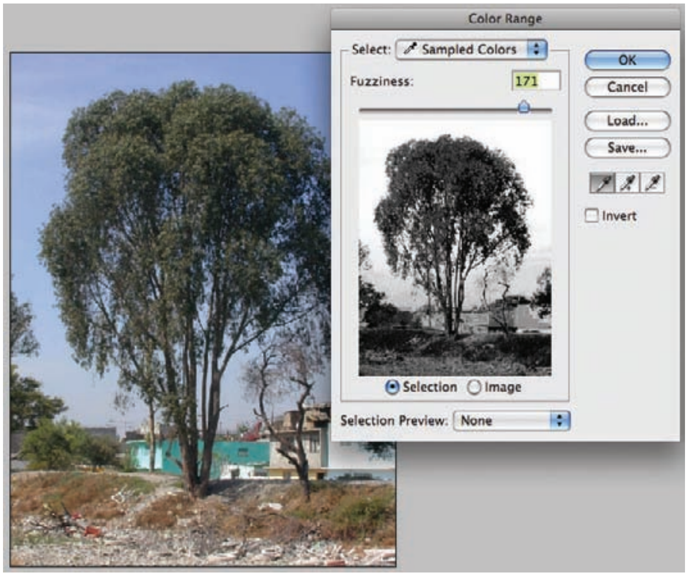


Figure 8.20. With the Fuzziness set high, too many pixels are partially selected. This selection is too broad to be used.

3. This selection has too wide of a range to be effective. After accepting the selection by pressing OK, use the Delete key to erase the selected pixels. The selection creates a ghosted image of a tree after the selected pixels are erased. The gray pixels in the canopy of the tree are partially erased along with the rest of the sky.

4. To make this selection more accurate, while preserving all of the pixels in the tree, use a low value for the Fuzziness and select multiple sample colors. Select multiple sample colors by using the Plus Eyedropper on the Color Range dialog box. Using the Color Range selection, the Fuzziness will be set to a value in the 20s. This value will depend on the image used, but will usually be lower than 40 to be effective. This is what the selection looks like at this Fuzziness level after the first sample color is selected from the sky.

Figure 8.21. If the Fuzziness is set too high, pixels in the canopy of the tree will be partially selected. The resulting image is a poor representation of the tree.

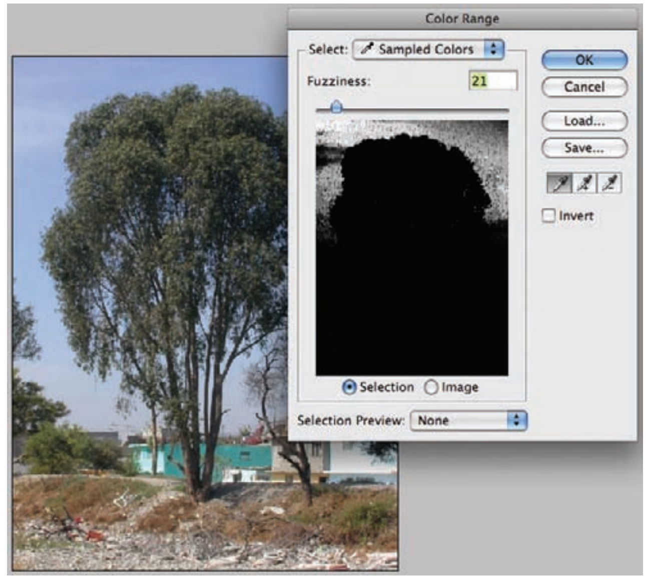


Figure 8.22. To select the sky using a Color Range selection, set the Fuzziness low and select one area of blue.

5. The white/light gray areas are the selected pixels. Very little of the sky is selected because the Fuzziness value is set low, making it more precise. The concept for this technique is to keep the Fuzziness precise, but add to the number of colors from which the Color Range tool picks. This is almost like doing multiple Color Range selections on top of each other. To select multiple color samples, choose the Plus Eyedropper from the bottom right of the dialog box. Click in a different area of the sky. Notice that the selection increases, making more of the sky white.
6. With the Plus Eyedropper still selected, continue to pick multiple other points in the sky. Without changing the Fuzziness, more of the sky is added to the selection. However, the pixels in the tree canopy remain completely masked, or deselected. Continue to click on other areas of the blue sky until most of the sky is selected, but the tree is still black.

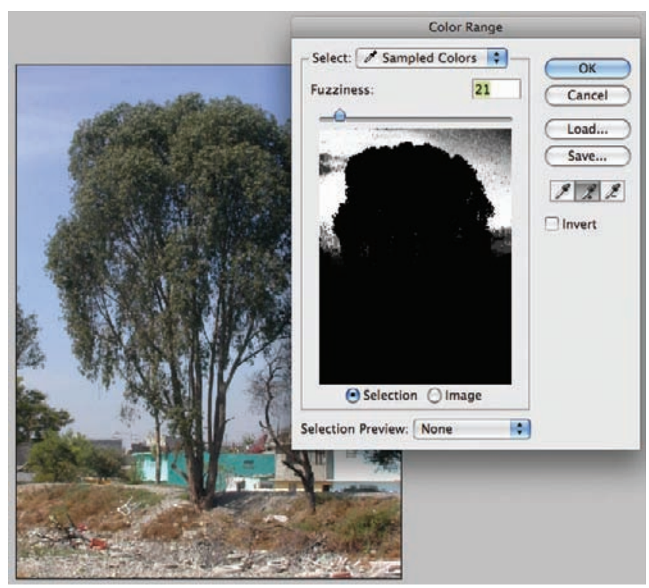


Figure 8.23. By choosing the Plus Eyedropper in the Color Range dialog box, multiple sample colors can be added to the selection.

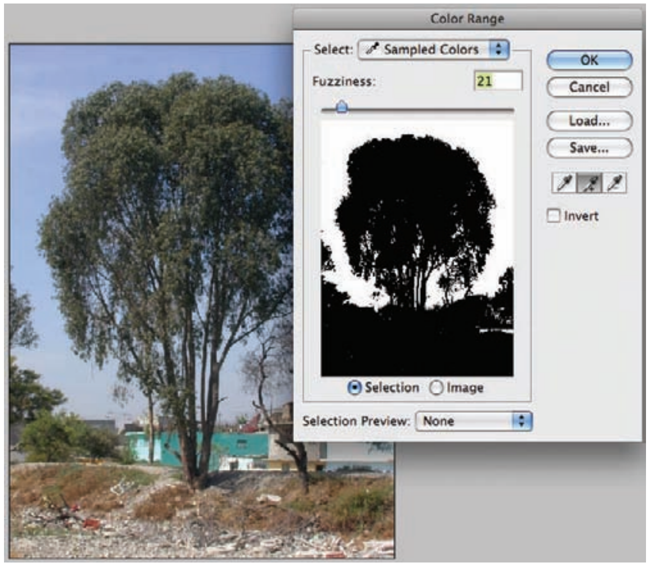


Figure 8.24. By clicking multiple times on different areas of the sky, the entire sky will be selected, yet the tree remains completely masked.

7. Click OK to accept the Color Range selection. Use the Delete key to remove the blue pixels from the image. Notice that the selection of the tree canopy is fuller and the edges are less ragged than when the Fuzziness was set too high.
8. This selection looks good on first observation; however, along the edge of the canopy, blue pixels are forming a halo around the tree. This halo effect is more apparent with a dark background behind the tree. To create this dark background, go to **Layer > New Fill Layer > Solid Color** and choose a dark color for the fill. Place this layer below the layer with the tree.
9. At this point, there are two ways to proceed. The first and best method is to deselect and try to make a more precise selection using more sample colors.

Figure 8.25. This selection preserves the colors in the canopy and produces a much less ragged edge.

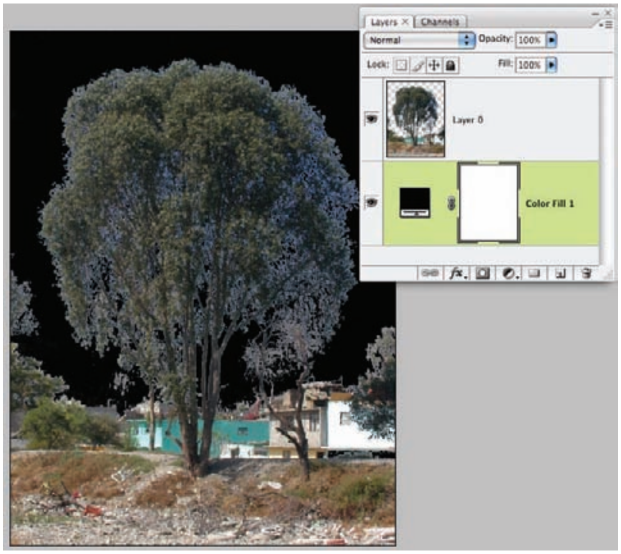


Figure 8.26. Place a dark background behind the entourage to test for a halo effect.

10. The second method is to zoom into the blue halo and use the Color Range selection to select just those blue pixels.
11. Erasing those blue pixels leaves you with an accurate, but slight choppy, selection.

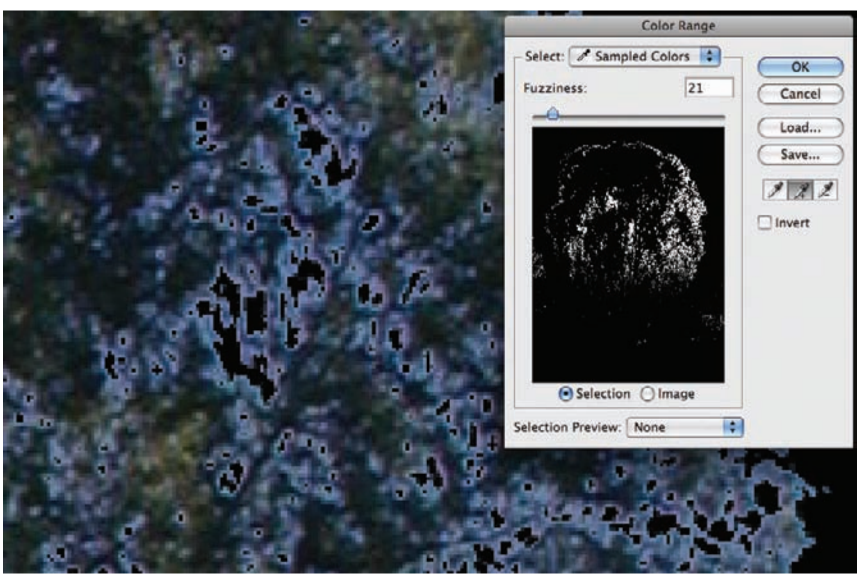


Figure 8.27. Performing another Color Range selection is one way to remove the halo from the entourage.

The By Pixel method was used to select these dispersed pixels from the solid color background. For the lower part of the tree, making the selections by hand will be easier and more accurate than using the Color Range or Magic Wand selections. The final steps to selecting away the entourage element from the background are shown here:

12. Use the Eraser tool to remove the larger parts of the background around the trunk.
13. Using the Lasso tool, select the areas around the trunk to be removed and press the Delete key.
14. The final entourage element is ready to be used in a section or perspective.

Figure 8.28. After the blue pixels are selected, the pixels can be deleted or the color of the pixels can be changed to match the background of the image.

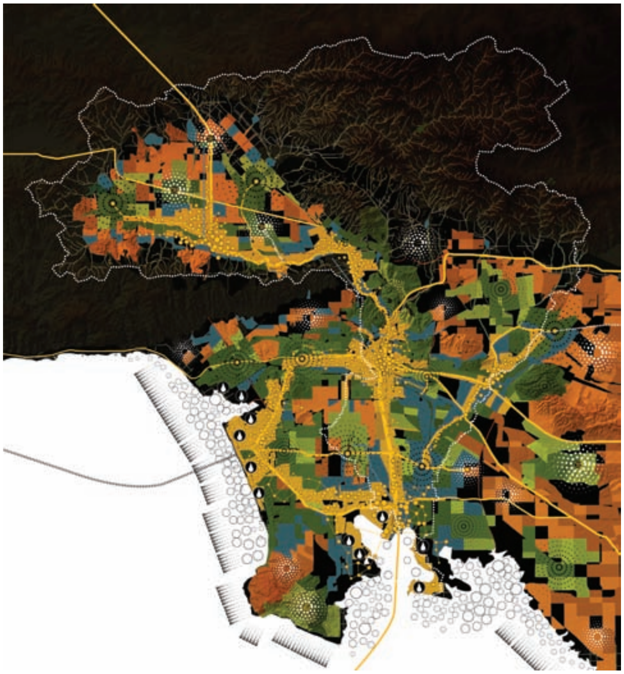
Figure 8.29. Use the Eraser tool to quickly remove large parts of the background.

Figure 8.30. Using the Lasso tool, select the areas near the trunk, and erase the pixels using the Delete key.

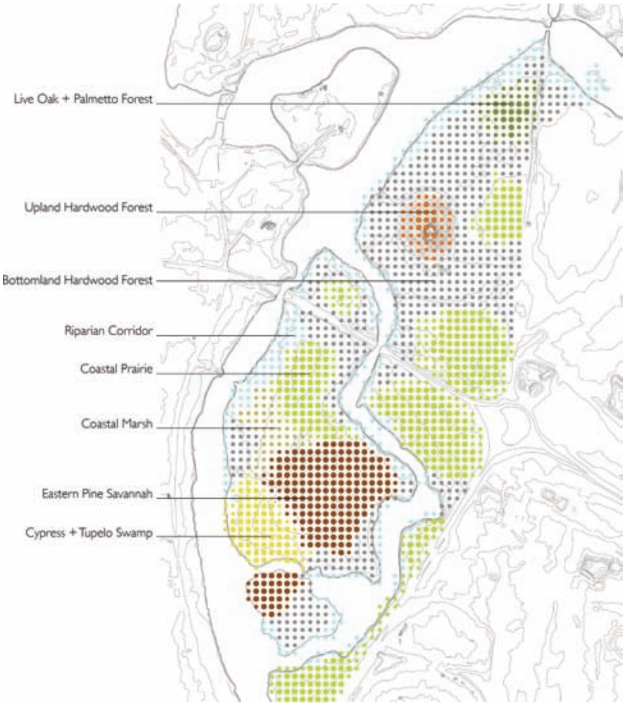
Figure 8.31. The final image is ready for use as entourage.

Part 3

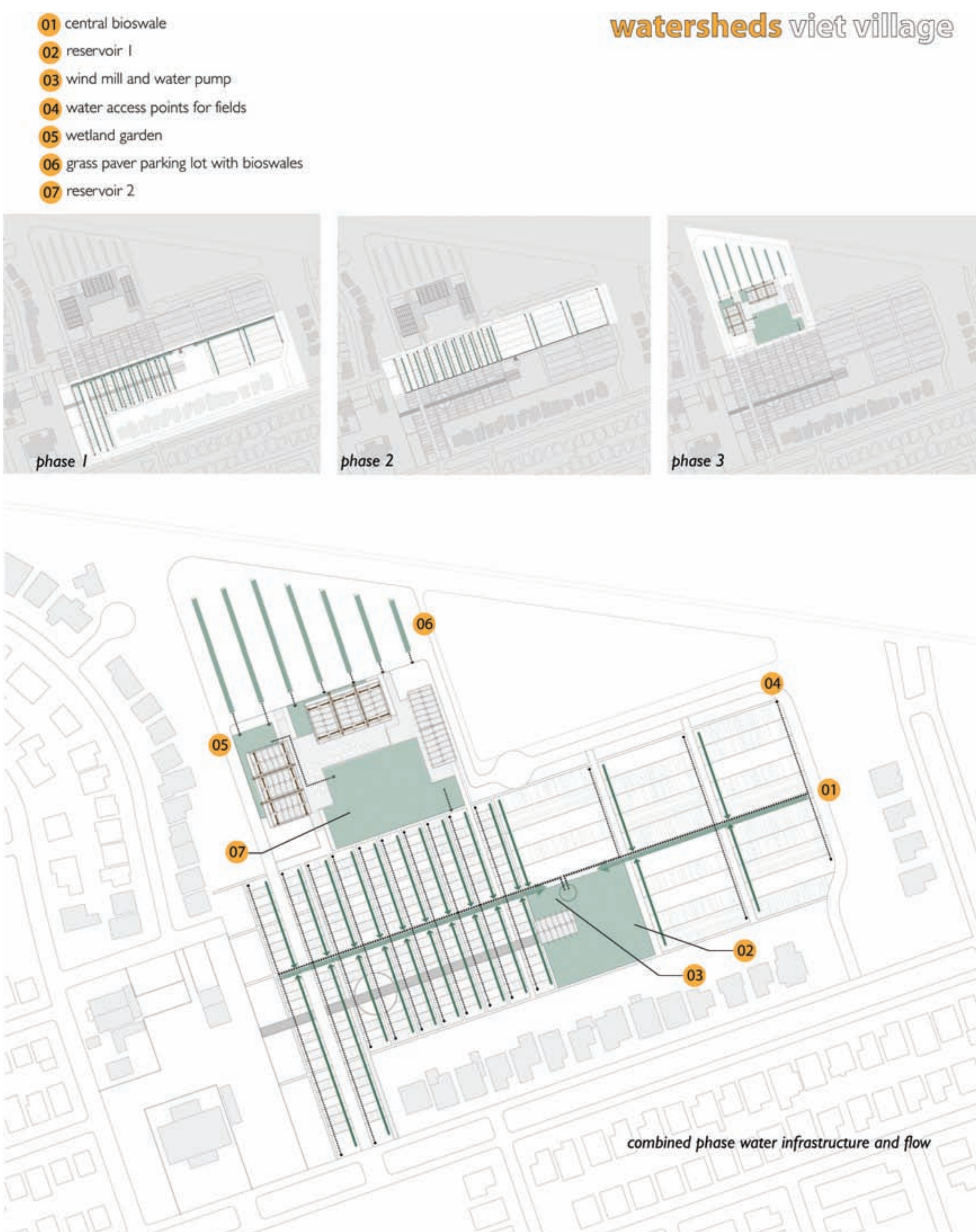
Design Diagrams



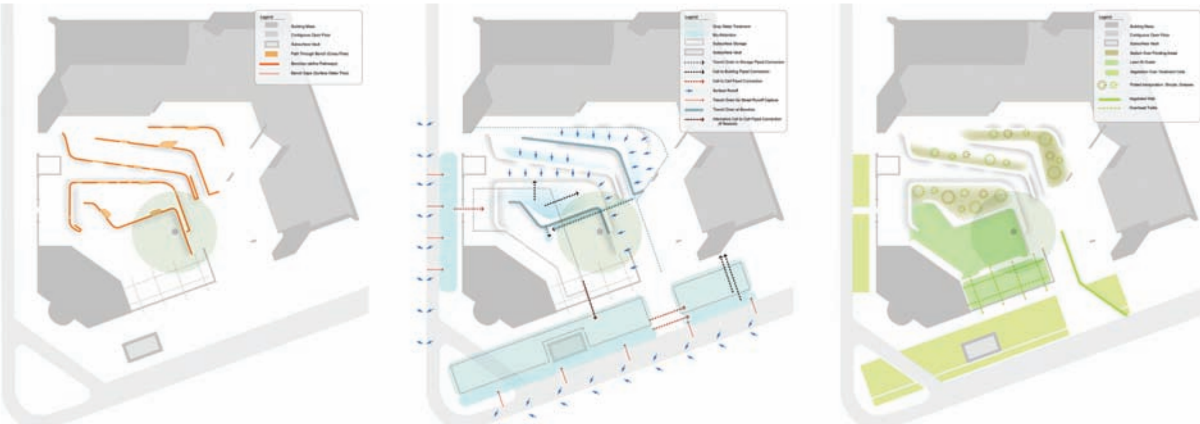
SCI-ARC Infrastructure Competition, Los Angeles, CA; development diagrams.



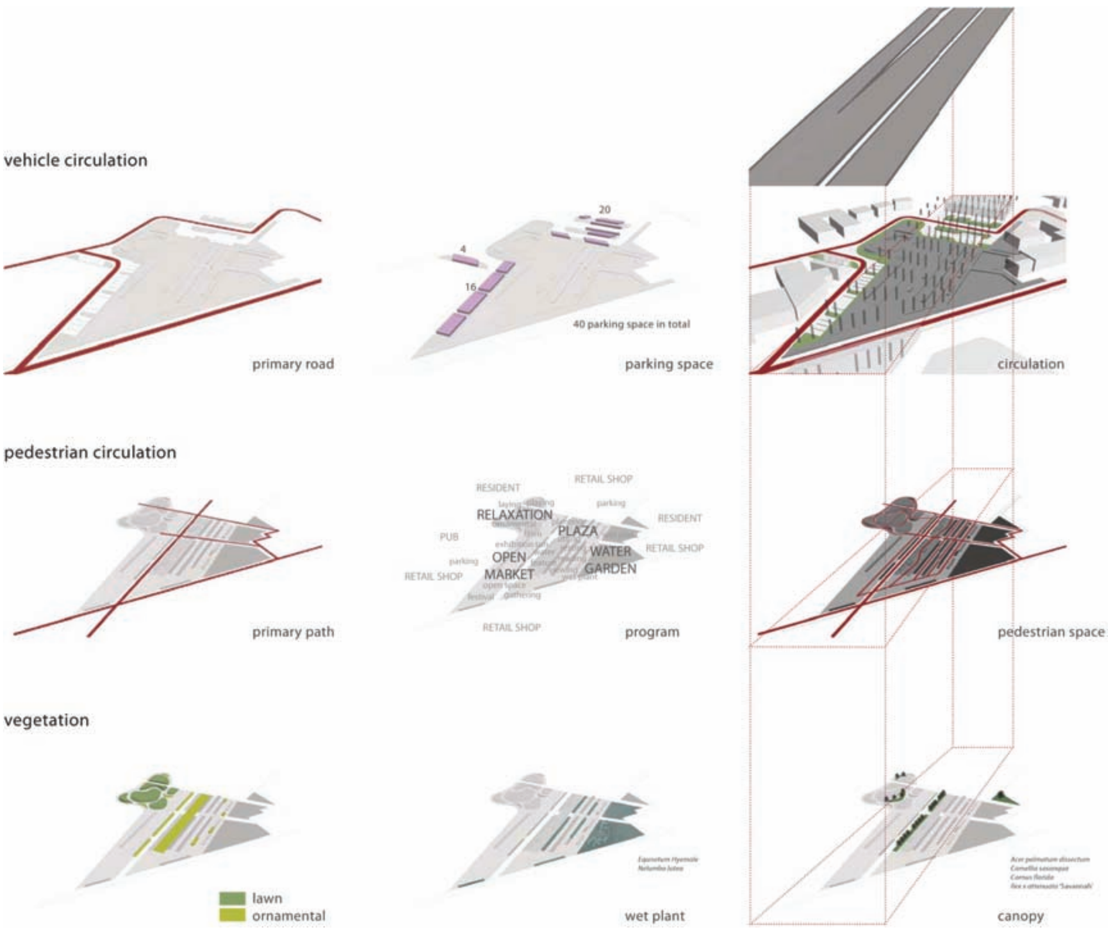
Couturie Forest, City Park, New Orleans, LA; ecosystems diagram.



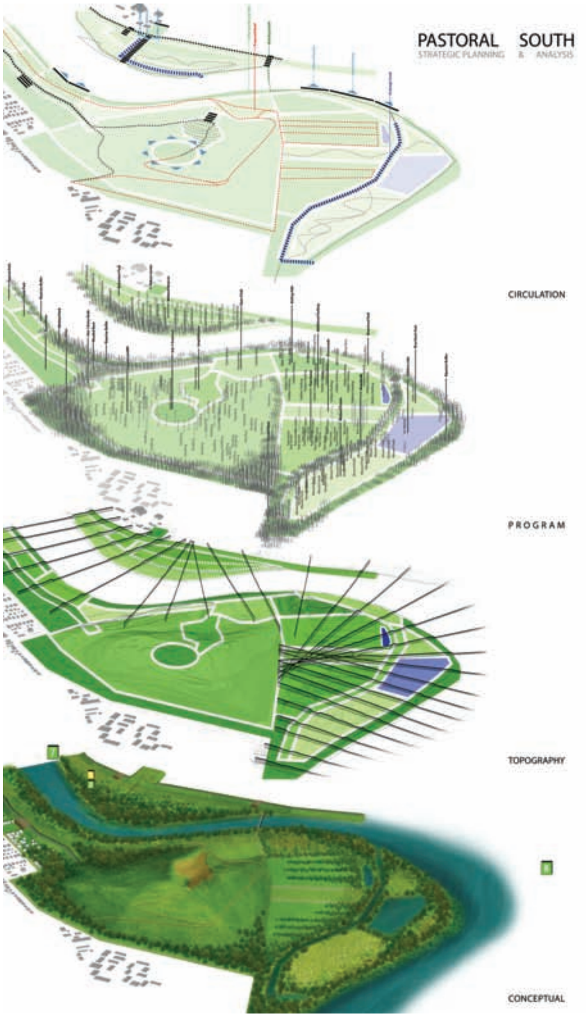
Viet Village Urban Farm, New Orleans, LA; drainage diagram.



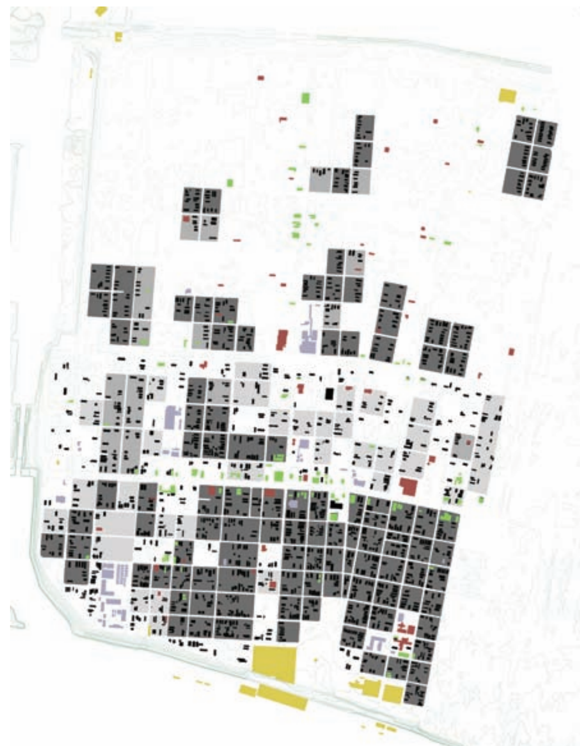
AIA Headquarters, Boston, MA; analysis diagrams.



Perkins Road Overpass, Baton Rouge, LA; site analysis.



Cedar Rapids masterplan, Cedar Rapids, IA; site analysis.



Lower Ninth Ward, New Orleans, LA; densities diagram.

Chapter 9
Introduction to Diagrams

Every phase of the design process involves diagramming. In their early stages, diagrams may inventory site conditions or explore design concepts. During client presentations, diagrams can distill complex information in order to explain a design concept, highlighting key elements within the site or illustrating important relationships. Diagrams are fundamental components of the site design process and are not merely representations of information; they are analytical and process driven. Diagrams serve a wide range of functions, including inventory, mapping, analysis, operations, and design concepts. Because diagrams serve so many purposes, it is important to understand the process as both passive and active. Both processes are important to the design professions and should not be thought of as diagram types but as diagramming modes.

Figure 9.1. Diagram identifying areas and associated program. Cedar Rapids, Iowa.

Passive Diagramming

A *passive* diagramming process can be described as an inventory and mapping that intends to mark locations or outline known physical, social, or cultural conditions. This process works with known information and typically creates a spatial representation of the data. For smaller sites, mapping and inventory are typically accomplished through site observation and overlays of surveyed data. This can be accomplished using scanned imagery or CAD data, depending on the sources available. Passive diagrams often extend known data and give the information a spatial quality, allowing it to be applied to design exploration.

For larger sites, such as cities or regions, Geographic Information Systems (GISs) are typically employed to create inventories and perform analysis of large datasets that would be tedious to do by hand. When creating base maps with GIS, the process is passive: the user specifies the process and the computer performs the actions. This is a generalization, however. It is possible to actively analyze, but most designers use GIS as a cartographic tool to assemble site data. It is important to understand how data is being processed, how boundaries are formed, and what information is being distributed in order to apply the work in future phases of the design process.

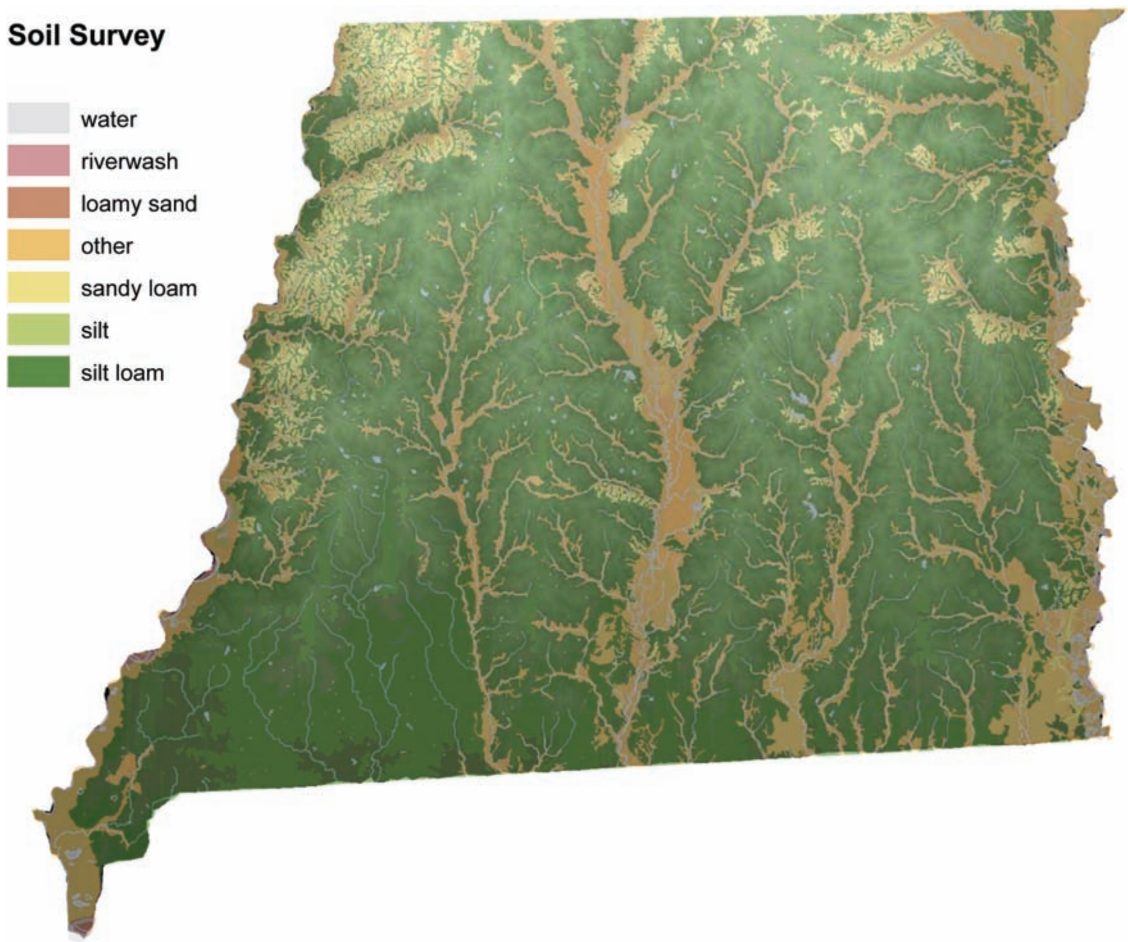


Figure 9.2. Soil survey created in ArcView GIS.

Active Diagramming

Diagrams that begin to create information through a process can be defined as *active*. This involves the active transformation of information in order to elicit or tease out new relationships and/or hierarchies. Active diagramming can be structured, measured, and methodological; or it can use interactions with the representational medium itself. The process can aim to increase complexity in the final representation or possibly cull extraneous information. Regardless of the myriad outcomes, active diagramming must be guided by a clearly designed process, a methodology that yields quantifiable documented results. The result is often the desired product of passive diagramming; however, in active diagramming the process often holds more weight than the result.

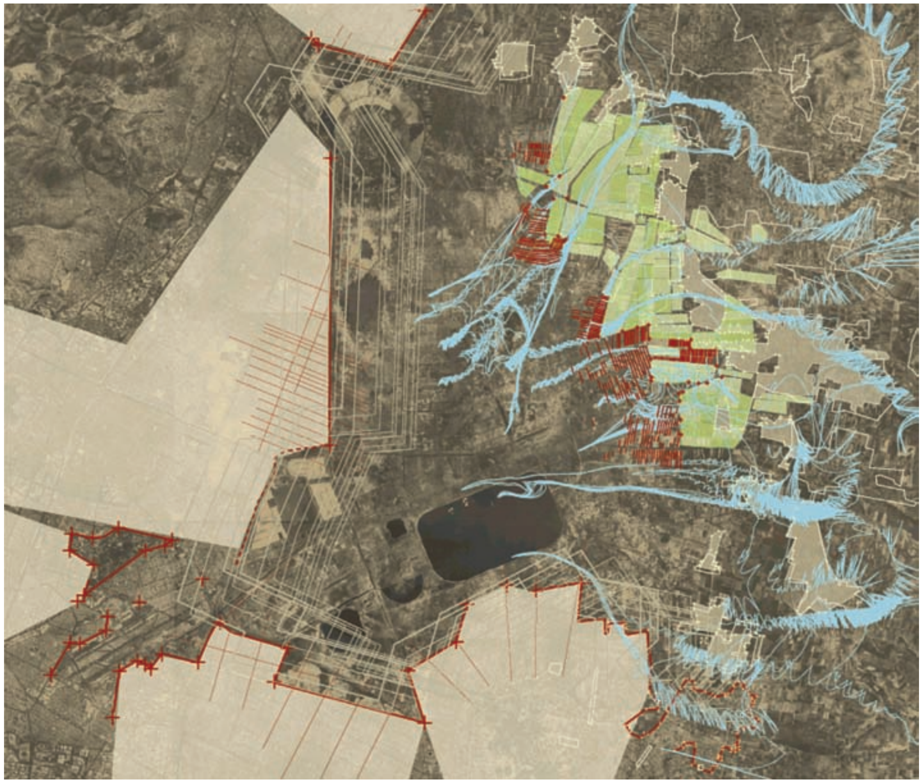


Figure 9.3. Active diagramming using Illustrator transformation tools. Mexico City Studio.

Analog and digital representation methods both have many tools for active diagramming within the design process. Analog methods may include processes of model making, interactions of media, or cognitive operations. With digital media, users must take the same approach with an entirely new toolset. In order to actively diagram, they need to explore the tools and envision their application to site and data transformations. Simple tools for transforming vector linework can be adjusted in order to create complex, yet measured interactions on a site. This active process of interaction must be documented, based on measured information, and interpreted to yield information that can be used for design inspiration.

It is also possible to automate large-scale interactions with site representations using programming or scripting. Information can be manipulated through multiple iterations in order to yield new densities, hierarchies, and/or voids. The active component occurs in the design of the program's code, as well as how the code is implemented to transform site information. Code can be written to process site information, yield a result, or even process steps that allow tweaking and interaction between steps in the process. Programming and scripting are a vast topic, but it is important to understand the computer's role as an iterative, transformer of data.

Communication

Communication is the key to any diagram. How does complex information get communicated through abstraction, distillation, and culling? All diagramming processes are meant to communicate. This is typically true of any form of representation. After all, the root definition of the term means "to represent." Because diagramming is often process-oriented, it is important to realize that documentation is vital to the process of diagramming in order to communicate the process.

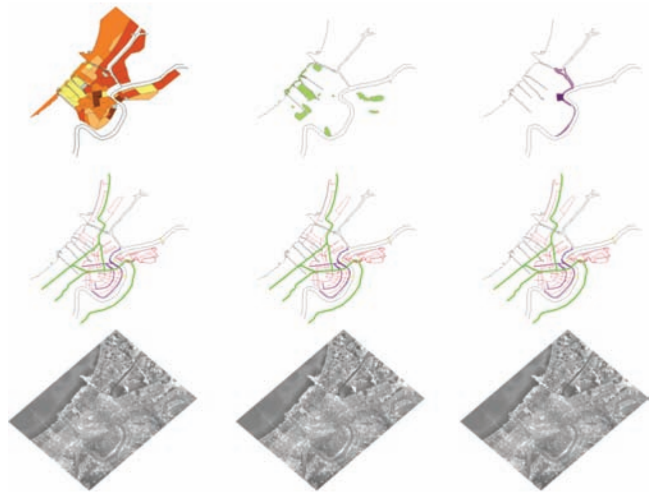


Figure 9.4. Diagrams can use a common base to create a reference between disparate data. New Orleans Edge Studio.

Abstraction

Abstraction is the process by which complex information is reduced or generalized in order to illustrate a concept for a specific purpose. Because information is ambiguous when abstracted, there needs to be a common framework of experience across the representation. This framework can be developed as references in drawings or through common cultural or social norms. Diagrams frequently contain references between existing conditions and proposed conditions. For example, someone could create a hydrology diagram that builds a dialogue between the site and the representation. The proposed hydrology would then be represented at the same scale and with the same features in order to reference the existing conditions diagram.

It is also common to abstract symbols based on common cultural and social norms. For example, a handicap parking symbol could be used instead of a labels because it is a standardized symbol. Understanding the context in which symbols will be presented is important; otherwise, confusion can occur when unknown symbols are used—especially in international projects.

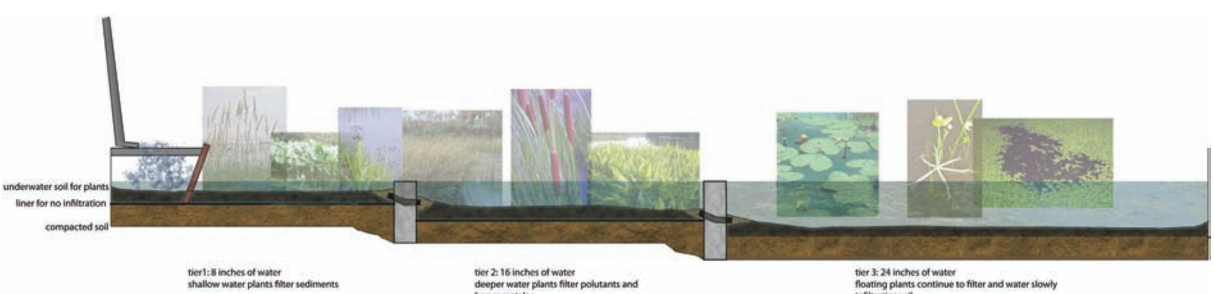


Figure 9.5. Diagrams can rely on symbols integrated into design drawings. Perkins Road, water cleansing prototype.

Distilling and Culling

Diagramming is an integral part of any design process, creating distilled representations of complex ideas. *Distillation of information* refers to the presentation of material in small quantities either over time or in multiple representations. *Culling* is the process of removing or extracting information based on established criteria. Typically, culling removes elements that do not directly contribute to the intended message, but it may also be an active process meant to find new relationships among complex data. Culling and distillation are symbiotic processes that attempt to present information in a logical and sequential manner.

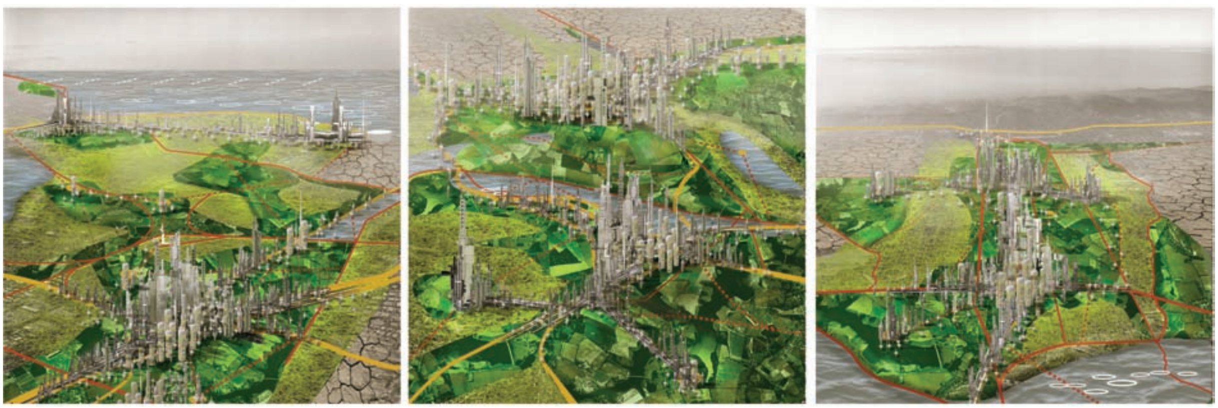


Figure 9.6. Complex representations can be distilled in order to highlight specific components necessary to support a design narrative.

Diagram Types

Functional diagrams represent the formal qualities and relationships of a site. A formal diagram can identify programmatic spaces or view corridors.

Analytical diagrams compare site elements in order to explain how a site functions. Analysis goes beyond the inventory of functional components and identifies a site's design opportunities and constraints.

Operative diagrams are a representational mode that attempts to understand complex site dynamics through the lens of an individual or constituency. Typically, operative diagrams attempt to synthesize local experience with larger site relationships.

Temporal diagrams represent site dynamics over a period of time. A timeline is an example of a temporal diagram, relating events with periods in time. Time becomes the meter to show change such as hydraulic fluxuations, seasonal vegetation, and many other landscape dynamics.

Chapter 10
Setting up an Illustrator Drawing

The artboard in Adobe Illustrator is the canvas where an illustration or layout will begin. Understanding the basic parameters and how they affect the rest of the process before embarking on a new project is important, and it will save headaches. Depending on how Illustrator will be utilized, the artboard can be thought of as a sheet of paper or a workspace used to create a diagram or illustration.

Document Size/Color Mode

Setting the document size correctly at the beginning of a project is not as critical in Illustrator as it is in Photoshop or other raster-based programs. This is because vector-based drawings can be rescaled with no loss of image quality. The exception is when a raster image is inserted. Once a raster image is inserted into the vector-based program, all of the same size limitations that traditionally apply to raster images apply. Raster images are typically inserted as base material for a diagram, such as an aerial photograph, or during the layout of a presentation board with multiple raster files such as plans and sections. With Illustrator, if the final size of the image is not known at the beginning of a project, the document can be set to a standard size, such as 11″ × 17″, and adjusted later. RGB mode is the recommended mode in which to work. See page 28 for an explanation of color modes.

The Raster Effects setting will affect how certain effects such as Drop Shadows, Inner Glow, and Outer Glow will appear on an image. There may also be situations where you want to rasterize part of the vector data; in those cases, the resolution of the rasterization will be determined by the Raster Effects setting.

Based Programs for Design Diagrams

Vector-based programs are good for creating diagrams because of the ease with which the lineweights, the placement of the lines, and colors of lines can be edited. There are many vector-based programs used in design offices, with AutoCAD, Illustrator, and Vectorworks being among the most widely used. For the techniques discussed in this section, Illustrator will be used as the primary vector-based program, although there are many other programs that have similar capabilities.

Illustrator is a robust program with a powerful set of drawing and editing tools. Illustrator has an entire set of tools that are geared toward the creation of websites, animations, and graphic design applications. Many of the advanced tools and techniques used in Illustrator are beyond the scope of this book and are rarely used in a typical architectural workflow. One of the strengths of Illustrator is the relatively easy learning curve and the short amount of time required to become proficient with the program. There are several basic techniques that must be mastered to effectively use Illustrator, including how to use the Pen tool, how to use layers, and how to adjust the Stroke, Fill, and Weight of the linework. These beginning techniques are explained briefly in the following section, but more in-depth coverage of these techniques can be found in numerous free tutorials online.

Importing an Aerial Photo into Illustrator

Techniques for constructing base images, such as aerial photographs, were discussed on page 42w. One powerful and simple technique for setting up a diagram is to import the raster-base image into Illustrator and then draw a diagram over it. When a Photoshop or other raster file is being importing into Illustrator, the first consideration is whether to link the image or embed it.

Link versus Embed

There are advantages to either linking an image or embedding an image into an Illustrator document. However, it is easy to change the status of an image from linked to embedded and back again. A *linked file* is similar to an external reference in AutoCAD. The file itself is saved separately from the Illustrator document. If the linked file is changed and resaved, the image in the Illustrator file will reflect those changes. An *embedded image* places the entire file into the Illustrator document. If the original file changes, these changes will not be reflected in the Illustrator document. If the embedded file is a Photoshop image, or any other layered raster image, the Embed command will flatten the image before inserting it. This reduces the ability to edit the image once it has been embedded. With a linked file, all the layers remain intact in the original file.

The advantage of linking files is the ability to update a file without having to reinsert it into Illustrator. For example, consider a plan that has been inserted into a final presentation board with text, leaders, and other images on the board. In this situation, it is typical for the plan drawing to have been placed precisely on the board, with the text and leaders corresponding to certain parts of the drawing. If the plan is updated to reflect new site conditions, it is much easier to have the plan automatically reflect the changes in Illustrator than to attempt to import a new plan into the board and place it in the exact location as the previous plan.

However, there are times when it is advantageous to embed the files—for example, when a single Photoshop file has several different layers, with each layer representing

a different phase of the project. On a single Illustrator board, there may be the need to show several phases at once. It is easier to turn on the layers that show Phase 1 and embed the file into Illustrator. After that file is embedded, the layers that show Phase 2 will be turned on and the file will be embedded into Illustrator again. Now the board has two views of the same Photoshop document.

Other times when embedding files is advantageous include at the end of a project and when the file is going to be sent to another person. It can be confusing to have several different linked files in several different folders. The linked files often become lost or the link does not work after the folder structure changes. In these cases, it is easier to just embed the images into a single file. Of course, the files can be relinked at a later time if needed.

The following demonstration will show how to place, link, embed, and relink an aerial image in Illustrator:

1. After setting the Document Size to the correct value, choose **File > Place** to place the aerial image into the Illustrator document. To link the image, check the option for Link. If this box is not checked, the file will be embedded.

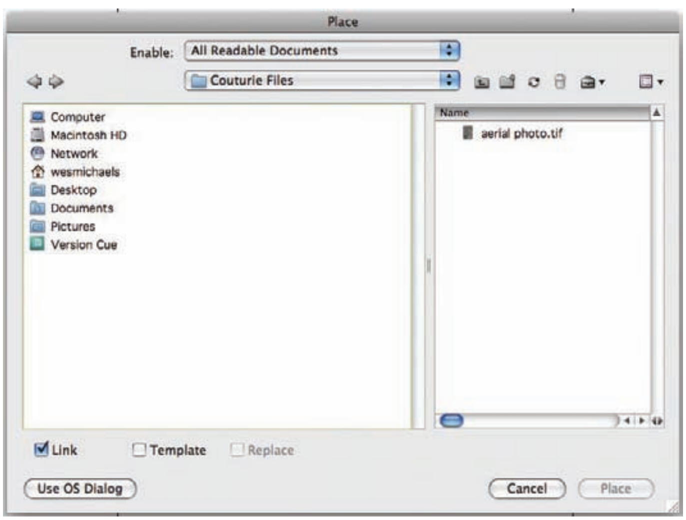


Figure 10.1. Check the Link box in the Place dialog box to link the file.

Figure 10.2. The Links palette shows the linked file. All linked and embedded files placed in the Illustrator document will appear in this palette.

2. To see a list of all linked or embedded images in the document, go to **Window > Links**.
3. To understand how links work, leave Illustrator running in the background, return to the original image in Photoshop, and change the Saturation of the image to –100, making the image appear as a grayscale image. Save the image in Photoshop. The file will automatically update in Illustrator.

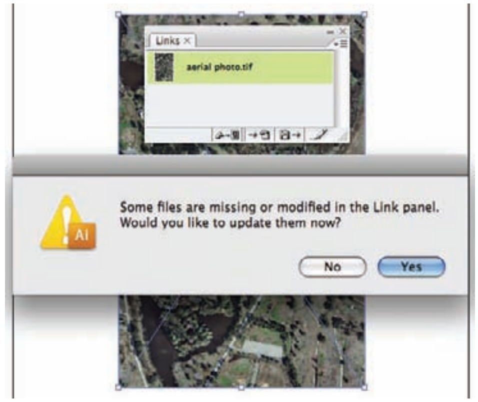


Figure 10.3. After the file is altered in Photoshop and saved over the original image, the file is updated in Illustrator. A dialog box will appear asking if the image should be updated. Click Yes to accept the changes.

Figure 10.4. The image was changed to grayscale in Photoshop and saved. The updated image reflects the changes to the Photoshop file.

4. The menu option on the Links palette shows several options for altering the linked file. To embed the image, select the linked image from the list in the Links palette and choose Embed under the menu options.

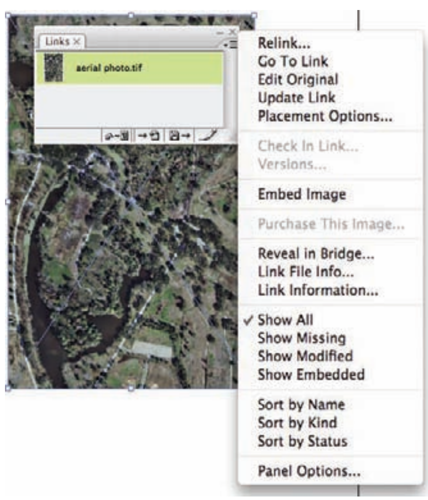


Figure 10.5. Several options including Embed Image are found under the Links Palette menu.

5. Once an image is embedded, it can be relinked from the same menu by choosing Relink.

Chapter 11
Linework in Illustrator

Illustrator excels at manipulating and modifying vertices and lines, as well as improving their appearance. When a designer is working with linework, maintaining clean consistent lines that develop a clear hierarchy throughout the drawing is important. Typically, linework is created using lineweights that appropriately represent an object's weight in the landscape or hierarchy in the design proposal. There are many conventions for how lineweights can be assigned within a drawing; in most cases, the designer will be able to experiment with these conventions as long as the illustration is consistent.

The following sections assume some familiarity with Illustrator. Techniques for navigating the workspace, creating new layers, moving objects between layers, selecting multiple objects, and other basic skills are beyond the scope of this book. Many free resources that provide tutorials on basic Illustrator skills are available online and in the Illustrator Help files. Illustrator is a powerful program. It has so many tools that the program's simplicity and ease of use is often obscured. However, for most office design work, only a handful of those tools are needed to complete most tasks. The tools most frequently used to demonstrate the Illustrator techniques in this book are the Selection tool, the Direct Selection tool, the Pen tool, the Type tool, and the Shape tools (such as the Rectangle tool and the Circle tool).

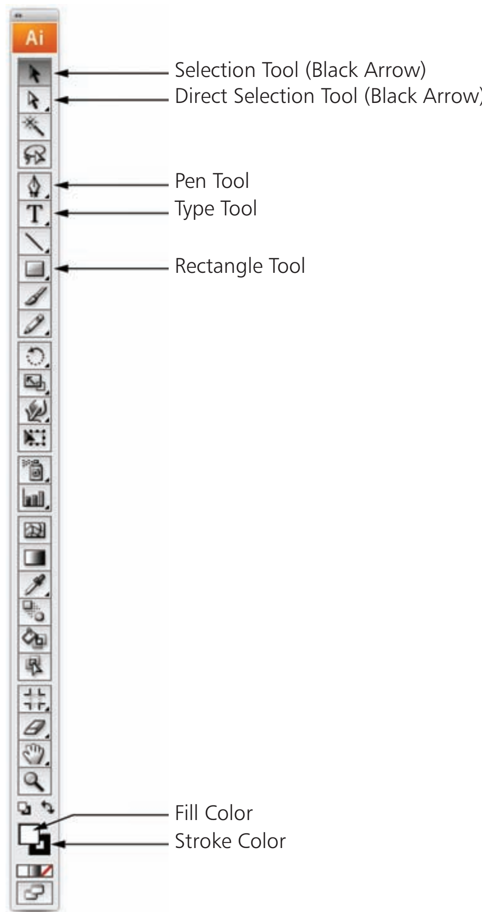


Figure 11.1. Most Illustrator techniques can be performed using only a handful of tools.

Shape Tools

Drawing shapes in Illustrator is easy. Several predefined Shape tools can be used to draw predefined geometries such as rectangles, circles, and polygons. With a little care, you can also draw these shapes with the Pen tool, but the Shape tools makes

Figure 11.2. When the Shift key is held down, the Rectangle tool and the Ellipse tool is constrained to create squares and circles, respectively.

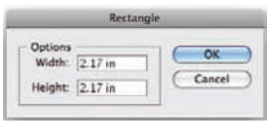


Figure 11.3. When the Rectangle tool is selected and the workspace is clicked, a dialog box will appear. The dimensions of the rectangle can be entered in it.

it much easier. Consider the following example of how to draw predefined geometries in Illustrator:

1. To draw a rectangle, choose the Rectangle tool. Click, drag, and release.
2. When the Shift key is held down, the proportions of the geometry is constrained. For rectangles, holding down the Shift key creates a square.
3. To create other shapes, click and hold the Rectangle tool to reveal other Shape tools.
4. For ellipses, holding down the Shift key will create a circle.
5. To draw a shape to a predefined set of dimensions, select the tool (for this example, the Rectangle tool is used). Click on the drawing. A dialog will appear, allowing the dimensions of the shape to be entered.

Pen Tool

The Pen tool is the primary tool used to draw complex shapes in Illustrator. Although the Shape tools make drawing predefined geometries easier, anything that can be drawn in Illustrator can be drawn with the Pen tool. Learning how to use the Pen tool can be difficult at first. However, learning to effectively use this tool will open some powerful features in many Adobe programs. Versions of the Pen tool can be found in almost all Adobe software used in design offices, from Photoshop to Flash.

To draw straight lines with the Pen tool, consider the following example:

1. Select the Pen tool and click on the workspace.
2. Click on another area of the workspace and then another. Press Enter to end the line.

Figure 11.4. Click with the Pen tool to draw lines.

Figure 11.5. To create horizontal and vertical lines, click with the Shift key held down.

3. To draw horizontal or vertical lines, click on the workspace.
4. While holding Shift, click to the right of the first point. The line will be constrained to a horizontal line.
5. The default constraints for the Pen tool are horizontal, vertical, and 45-degree angles. These constraints can be changed to angles other than 90 degrees and 45 degrees. To change the constraint angle, select **Preferences > General**. A dialog box will appear that allows any constraint angle to be entered. This technique can be used to draw a series of parallel and perpendicular lines in a drawing at an angle other than 90 or 45 degrees.

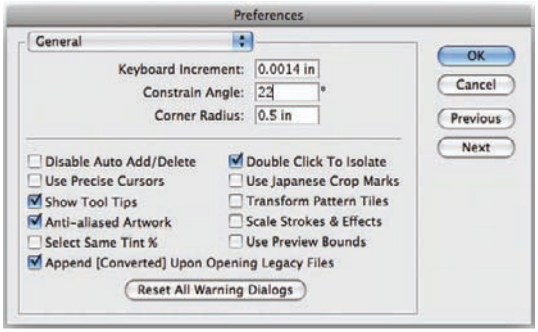


Figure 11.6. The angle of constraint can be changed in the Preferences dialog box.

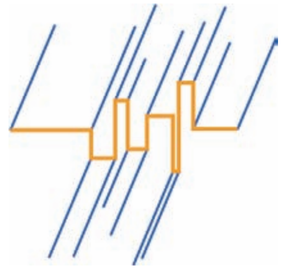


Figure 11.7. The constrained angles of the lines can be used to create a series of parallel and perpendicular lines at any base angle. In this figure, the blue lines are constrained to a 22-degree angle and drawn with the Pen tool.

The Pen tool can be used to draw more than straight lines. It can also be used to draw complex curves or multiple segment lines that are a combination of lines and curves. The curves that the pen tool draws are called Bézier curves because of the mathematics used to draw the curve. The Bézier curve is named after a French engineer who originally used these types of curves to design automobile bodies in the 1970s. Bézier curves are now widely used in a variety of digital representation packages.

Instead of using an arc that has a beginning, middle and end, the Pen tool uses a unique mathematical formula to draw the curves. A simple Bézier curve has two *end-points* (or anchor points) and two *direction lines*, as Adobe refers to them (or *handles,* as referred to in this book). The handles control the direction and tangency of the arc. These handles represent the tangent line of the curve. By moving the handles closer or farther away from the anchor point, you can control the shape of the curve.

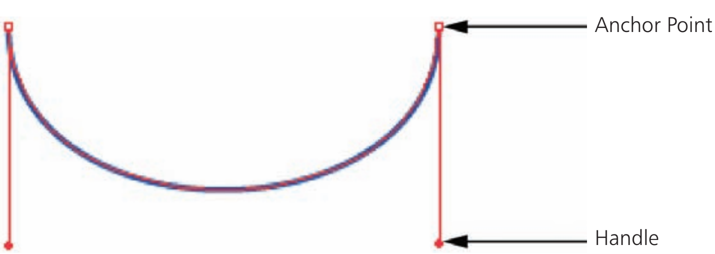


Figure 11.8. A simple Bézier curve consists of two anchor points and two handles.

To draw a simple Bézier curve, do the following:

1. Select the Pen tool. Click and drag the mouse on the workspace.
2. Click and drag a second point.
3. By clicking and dragging a third point, you lengthen the curve.
4. A single click will create a straight segment in the line.

Editing Tools

Two main editing tools are used to alter lines and shapes in Illustrator: the Selection tool (the black arrow) and the Direct Selection tool (the white arrow). To understand how the black arrow edits objects, consider the following example:

Figure 11.9. The blue rectangle on the top left is altered with the black arrow to get the blue shape below. Although the shape has different dimensions, it is still a rectangle with four parallel sides. The orange rectangle on the top right is altered to get the orange shape below. This object is no longer a rectangle with four parallel sides. The white arrow can alter the fundamental shape of an object.

1. When an object is selected with the black arrow, a *bounding box* with small grips attached to it appears.
2. To move an object, click on the object and drag it to another location.
3. To make a copy of this object, hold down the Alt key while dragging the object. A second arrow will appear to indicate that the object is being copied.
4. To copy an object horizontally or vertically, hold down the Shift key while the object is being moved.

To change the size of an object, or rotate an object, do the following:

1. Change the size of the object by clicking on a corner and dragging the corner to another point.
2. By holding down the Shift key while dragging the object, you can constrain the proportions of the object.
3. When you hold the cursor near one of the grips, a small rotation arrow will pop up
4. Click and drag the grip to rotate the object. Holding down the Shift key will again restrict the angle of rotation.

To draw accurately with the Pen tool, you need to edit the lines after they have been drawn. It is impossible to draw every shape with the Pen tool on the first pass. Although you can do some editing with the black arrow, you will need to use the white arrow for most fine-tuning of a shape. The black arrow selects the entire object and changes its dimensions. The white arrow selects the control points of an object, rather than the entire object. This allows the shape of an object to be changed.

The white arrow is used to select and manipulate the anchor points of an object. To understand how anchor points are selected and used to alter the shape of an object, consider the following example:

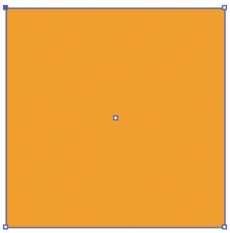


Figure 11.10. The upper-left anchor point is selected. The other three anchor points are unselected. The anchor point in the middle is not used very often, but selecting it will select all anchor points in the object.

1. To select an anchor point, use the white arrow. Either click directly on the point, or click and drag a box around the point. It is important to be precise when you select anchor points. The white arrow must be exactly on top of the anchor point for it to be selected. Clicking slightly to one side or the other of the point will prevent the anchor point from being selected. Most problems with using the white arrow can be traced back to an imprecise selection of the anchor point. A small box with a white center will appear next to the cursor when it is directly over the anchor point. Watch for this box to appear before clicking on the anchor point.
2. Once an anchor point is selected, it will be filled in and no longer have an open or white middle. This indicates that it is selected. Unselected anchor points will have

a white area in the middle of the anchor point. Again, it is important to look closely at the anchor points to ensure that only the intended anchor point is selected.

3. To manipulate an anchor point, use the white arrow to click and drag the selected anchor point to another location.
4. Two anchor points can be selected at the same time by holding the Shift key and selecting multiple points with the white arrow, or by dragging a box around multiple anchor points with the white arrow.
5. If more than one anchor point is selected, the anchor points will move together.
6. You can use the white arrow to drag and move points.

Figure 11.11. Multiple anchor points can be selected on different objects. In this figure, the upper-right anchor point of the blue rectangle is selected and the upper-left anchor point of the orange rectangle is selected.

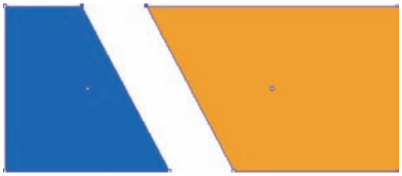


Figure 11.12. When one of the anchor points is clicked and dragged with the white arrow, both anchor points move at the same time.

The white arrow is also used to adjust curves to different shapes. When you are adjusting curves, selecting and moving the anchor points is similar to the techniques shown in the following example. However, a second element in curves must also be adjusted: the handles. The handles are not selected like the anchor points. The handles appear on the curve when the anchor point is selected. To move the handles, use the white arrow to click on the end of the handle and drag the handle to a new position.

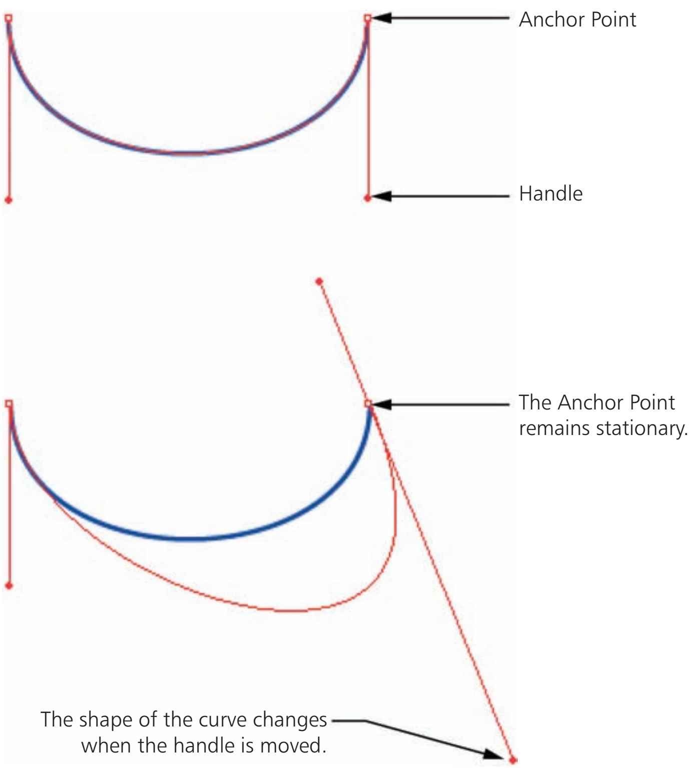


Figure 11.13. When the handle is clicked and dragged, the shape of the curve changes.

Mastering the use of curves in Illustrator takes practice. Following are some techniques that can be used to increase proficiency with the Bezier Pen tool:

- The majority of curves drawn with the Pen tool will need to be edited to achieve the final shape. Try to approximate the shape on the first pass quickly, and then fine-tune the shape later with the white arrow.
- Use fewer anchor points when possible. The Add Anchor Point tool can be used to increase the number of anchor points if needed later. Using too many anchor points can create "wobbly" curves and make them difficult to edit. Adding or subtracting anchor points can be accomplished by clicking and holding the cursor on the Pen Tool icon. A second set of tools will appear, including the Add Anchor Point tool, the Delete Anchor Point tool, and the Convert Anchor Point tool.
- When drawing a curve from scratch, do not drag the handles very far. For most curves, two handles should not cross one another. Handles normally do not cross the same line.
- To cut a line into separate segments, use the Scissors tool (located below the Eraser tool). Choose the Scissors tool and click at the point where the line is to be split.
- To join two separate lines, use the white arrow to select the two endpoints of the two lines. The endpoints do not need to be touching for this command to work. Select **the Object > Path > Join Command** from the menu. Illustrator will draw a line between the two points.

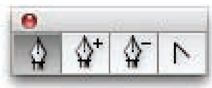


Figure 11.14. Select the Convert Anchor Point tool and click a curved anchor point to convert it to a straight point, or Click+drag a straight point to convert it to a curve. Select the Add Anchor Point Too and click on the line to add an anchor point. Select the Delete Anchor Point tool and click on the anchor point to be deleted.

Appearance of Lines and Shapes

One significant advantage of drawing in Illustrator compared to AutoCAD is the ability to see the final product on the screen as it is being drawn. Seeing the interplay of colors, transparencies, and lineweights onscreen allows more experimentation with the drawing technique and gives immediate feedback about how different techniques affect the image. While there are always differences between a printed version of a drawing and an image on the screen, there is less guessing in Illustrator about lineweights and colors than in AutoCAD. There is no need to create a preview to see how an image will look. The image on the screen is very close to what the image will look like when printed properly.

Illustrator colors its object using *fills* and *strokes*. Every object, except for a straight line, can have both a fill and a stroke. Each object can also have only a fill or only a stroke. The fill and the stroke each have their own independent color, and they can have independent transparencies and other effects as well.

The following is an example of how to change the fill and stroke of an object:

Figure 11.15. The rectangle in this figure has an orange fill and a blue stroke. Notice the Fill and Stroke colors in the Tools palette.

1. Select the object using the black arrow.

2. To change the color of the fill, click on the Fill box in the Tools palette. If the Fill icon is behind the Stroke icon, the Fill icon will come to the front.
3. Select a color for the fill from the Swatches palette by selecting **Window > Swatches** and clicking a color.
4. To change the stroke color, click on the Stroke icon to bring it to the front and select another swatch.
5. To remove a fill or a stroke, select the icon with the red stripe going through the swatch. This sets the value of the color to None, or invisible.

Figure 11.16. When the None swatch is selected, the fill is removed from the object.

It is usually better to use the Swatches palette in Illustrator rather than the Color Picker. There are a few reasons for this. The first is that Illustrator comes with many pre-defined color palettes that provide sets of colors that work well together. Many other color combinations, such as the ones in Kuler, are also available from outside Illustrator.

It useful to use these predefined palettes when several documents are being worked on, or when a group of people are working on a project. Custom swatches can be saved into new palettes and used to create a set of standard colors for an office.

Another reason it is a good idea to use swatches is that the Eyedropper tool works slightly differently in Illustrator than in Photoshop. In Photoshop, it is less important to use predefined colors because the Eyedropper tool can copy a color from one area to another. However, in Illustrator, the Eyedropper not only copies the color, but it copies the other properties of an object as well, including any effects or transparencies. This can cause problems when all that is needed is to copy the color of one object to another. It is much easier to just choose the color from the Swatches palette than use the Eyedropper tool.

A final reason for using swatches is the ability in Illustrator to select all objects that are the same color. For instance, using the **Select > Same > Fill Color** operation from the menu bar, all objects in the drawing with a red fill can be selected at once. If the colors are slightly off due to the use of the Color Picker, this option is difficult to use.

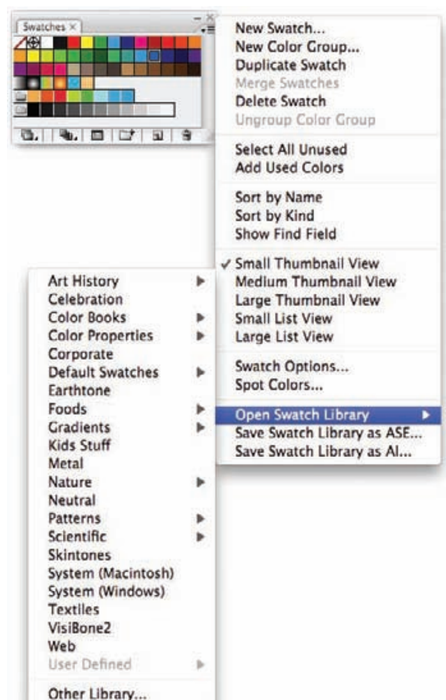


Figure 11.17. Many predefined sets of swatches are available in Illustrator. These swatches can be found through the pull-down menu in the Swatches palette.

Stroke Weight and Dashed Lines

The *stroke weight* is how thick or thin the stroke is in an object. You can change the stroke weight by selecting the object and choosing a new stroke weight from the Strokes palette. The Strokes palette can be found under **Windows > Strokes**.

Dashes lines are simple to use in Illustrator and offer a great advantage over Photoshop when it comes to creating diagrams. Creating dashed lines in Photoshop is cumbersome and the lines

Figure 11.18. The Strokes palette can be found under **Windows > Strokes**.

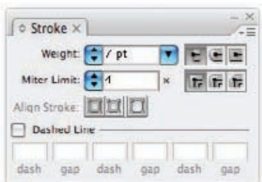


Figure 11.19. Double-click the word Stroke to reveal the expanded options.

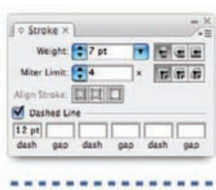


Figure 11.20. Select a line and check the Dashed Line box to create a dashed line.

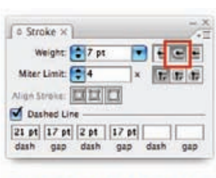


Figure 11.21. The dashes and gaps in the line can be altered. Selecting the Round Cap option creates the rounded edges of the dash.

are not easily edited. To understand how to create a dashed line in Illustrator, consider the following example:

1. Select a line using the black arrow. Open the Strokes palette and expand the palette to reveal the Dash Lines option.
2. Check the Dashed Line box.
3. The dash size of the line can be altered by entering values in the Dash/Gap sections of the palette.
4. The dashed line can be changed back to a solid line by selecting the line and deselecting the Dashed Line box.

Transparency

The transparency of objects is changed through the Transparency palette. Transparencies are extremely useful for creating diagrams. Illustrator makes using transparencies easy:

1. Open the Transparency palette from **Windows > Transparency**.
2. To make an object transparent, select the object and enter the value in the Opacity box. This affects the overall transparency of the object, so both the Fill and the Stroke are the same opacity.
3. It is possible to make just the fill transparent or just the stroke transparent by using the Appearance palette.

Appearance Palette

The appearance of the objects in an Illustrator drawing is a combination of underlying vector linework and a series of effects that create what is seen on the screen. For example, when the stroke weight of a line is changed from 2 point to 7 point, the underlying vector geometry does not get larger, only the appearance of the line increases. Stroke weight and color are effects that are rendered on the screen in real time. Switching to Outline mode will display the underlying geometry of a drawing without the effects applied. The following figures show how switching between Preview mode and Outline mode changes the way the drawing is presented on the screen. To switch between Preview mode and Outline mode, **select View > Outline from the menu**.

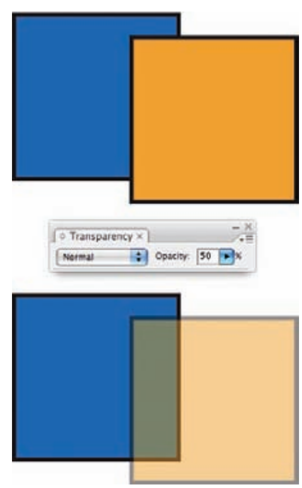


Figure 11.22. When using the Transparency palette, the entire object, including fill and stroke, is rendered with the same opacity.

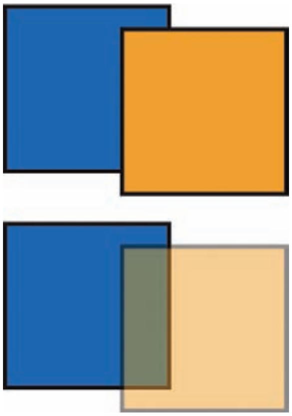


Figure 11.23. Preview mode is the standard view for working in Illustrator.

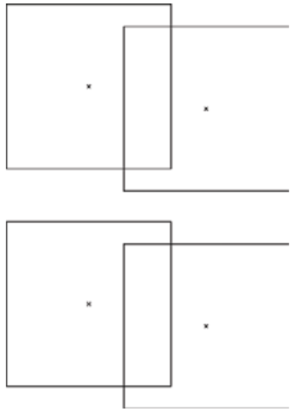


Figure 11.24. Outline mode shows only the underlying geometry without any effects such as stroke weight or fill color. This is similar to a Wireframe view in 3D modeling software.

The Appearance palette shows the effects that rendered onto the underlying geometry of the object. From the Appearance palette it is possible to alter all of the parameters that contribute to the appearance of the object. To understand how the Appearance palette affects a drawing, consider the following example:

1. Select an object in the drawing. The Appearance palette can be found in the menu under **Window > Appearances**.
2. All of the components that make up the object's appearance are listed In the Appearance palette. For a simple object, the only components listed are the Stroke, the Fill, and the Transparency.
3. As shown in the previous example, changing the transparency of an object using the Transparency palette alters the Default Transparency setting.
4. Change the Default Transparency setting back to 100 percent. To change the transparency of only the fill, click on the Fill box in the Appearance palette.
5. A change to the transparency using the Transparency palette now produces a transparent fill, while the stroke remains opaque.

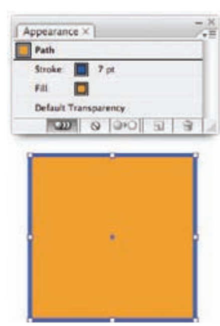


Figure 11.25. The Appearance palette lists all the components that make up an objects appearance. Only the stroke, fill, and transparency components are shown when a simple object is selected. To change the Stroke or Fill settings, double-click on the item in the list.

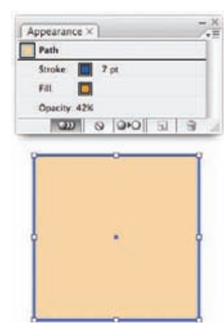


Figure 11.26. Changing the transparency of an object using the Transparency palette changes the Default Transparency setting for the entire object. Both the Fill and Stroke settings are changed to 42 percent opaque in this figure.

6. Any item that affects the appearance of an object will appear in this list. For example, when a dash is added to the stroke, the description of the stroke changes in the list.
7. If an effect, such as a Drop Shadow, is added from the Effects menu the effect will also appear in the list. The effect can be altered later by double-clicking on the effect. It can be removed from the object by deleting the effect from the Appearance palette.

Figure 11.27. The fill is transparent, while the stroke remains opaque. The default transparency has returned to 100 percent opaque. The Appearance list has expanded to show the transparency of the fill.

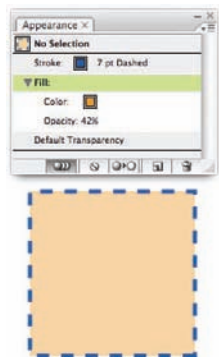


Figure 11.28. When an object changes its appearance, the change shows up in the Appearance palette. The addition of a dash to the stroke is shown in the list.

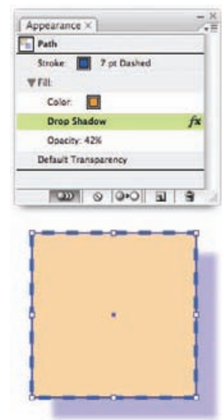


Figure 11.29. Effects will show up in the Appearance palette. To alter an effect, double-click the effect in the list.

Chapter 12
Custom Linework

Beyond using the Pen tool and other standard drawing tools to create diagrams, Illustrator offers techniques for creating custom linework through the use of brushes. Brushes in Illustrator are different from the brushes used in Photoshop. Brushes in Illustrator can be thought of as "effects" placed on the vector linework. There are several ways to build custom lines for use in diagrams. The lines can include symbols, words, custom dashes, or shapes. The custom lines that are developed can be saved in libraries and used on different projects.

Creating a Pattern Brush from Shapes

Custom linework is created from shapes drawn in Illustrator using the drawing tools. The custom lines can have different start points, middle segments, and endpoints. Custom corner shapes that keep the linework consistent can also be created. Custom linework is created using the Pattern brush in Illustrator. For each segment of the line, a custom shape is drawn. To understand the anatomy of a Pattern brush, consider the following example:

1. Create three different shapes to use as the start, middle, and finish of the line. This example uses text to help explain the makeup of the line. However, if text is used, the text must first be converted to geometry, rather than editable text. For more information on text and how to use the Type tool, see page 120.
2. To convert the text to geometry, select the text with the black arrow and select **Type > Create Outlines**. This changes the editable text into simple line drawings. The text can no longer be changed using the Type tool.

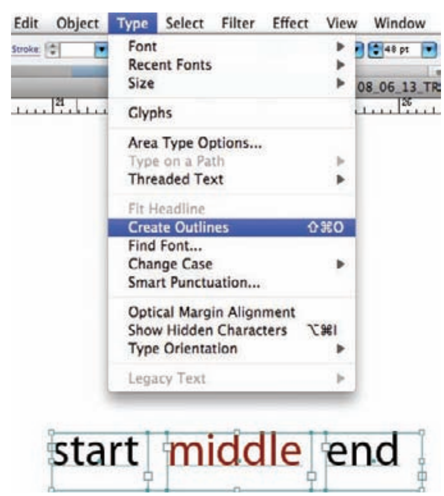


Figure 12.1. For text to be used in a custom line, it must first be converted to geometry. The text cannot be edited once it has been converted to outlines.

Figure 12.2. The text has been converted to geometry. This text behaves the same as any other line or object in Illustrator.

3. To create the Pattern brush, bring the Brushes palette to the workspace from **Windows > Brushes**. To create a new brush, click and drag the middle segment into the center of the Brushes palette and release.
4. A dialog box will appear. Choose Pattern Brush as the type of brush to create.

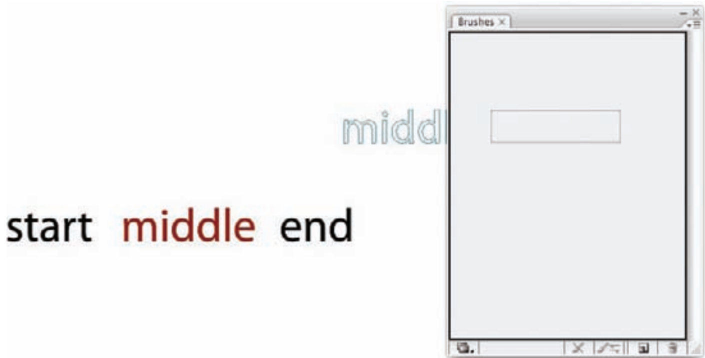


Figure 12.3. To create a new Pattern brush, drag the object into the Brushes palette and release. Notice that the entire border around the Brushes palette is bold. This signifies that a new brush is being created. An existing brush will be edited later in this section.

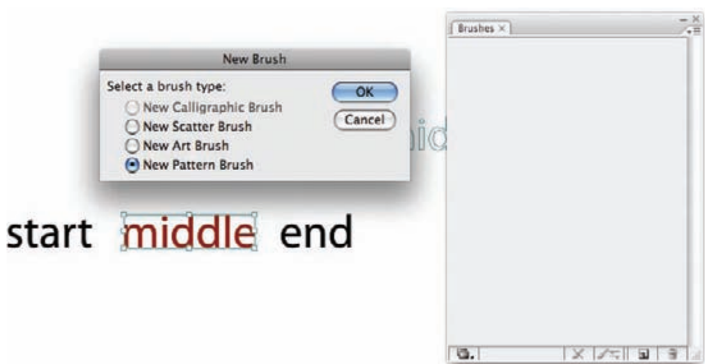


Figure 12.4. Choose New Pattern Brush. The other brushes have interesting effects and work in a similar way to the Pattern brush. However, they are not often used in a design office and are beyond the scope of this book.

5. Once the new Pattern brush has been created, the Pattern Brush dialog box appears. This dialog box contains all the elements of the brush. The “middle” geometry will appear in the corresponding area at the top of the dialog box. Not all of the segments need to be defined for the brush to work. In practice, it is often enough to simply define the middle segment.

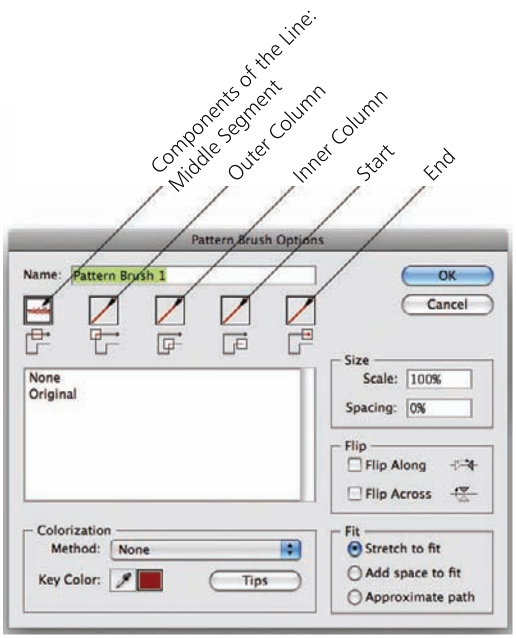


Figure 12.5. All of the elements that make up a Pattern brush are shown in this dialog box. Not all elements need to be defined, however. It is often enough to simply define the middle segment.

6. To apply this brush to a line, select OK to close the dialog box. Draw a line with the Pen tool or any other drawing tool. Select the line with the black arrow. In the Brushes palette, select the brush to apply.

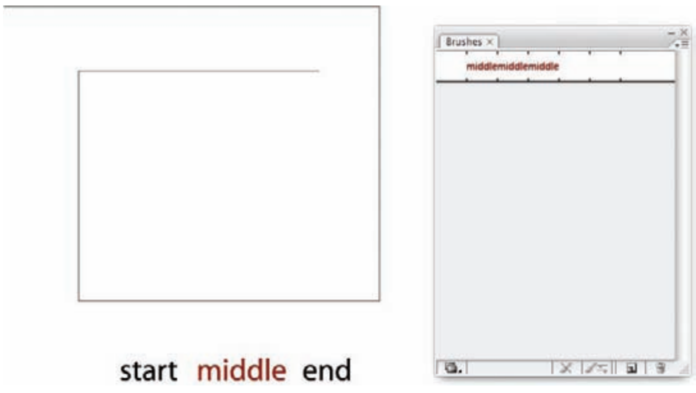


Figure 12.6. To use a Pattern brush, first draw a line using the Pen tool.

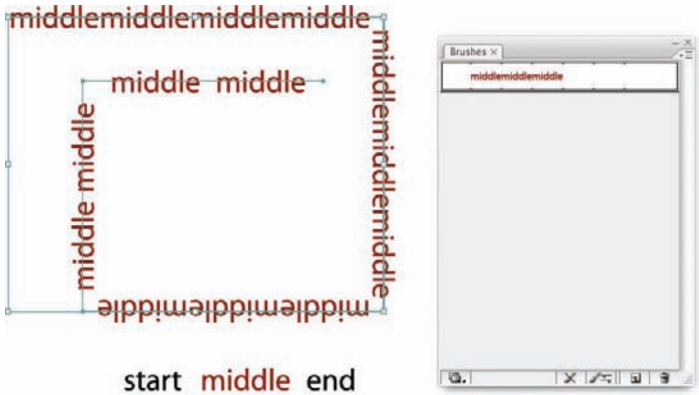


Figure 12.7. With the line selected, choose the Pattern brush to apply to the line.

7. To add a start and end segment, select the "start" geometry and drag it over the brush while holding the Alt key. The small box will be highlighted to indicate that the line is being changed and a new line is not being created. This will place the start and end geometry at the beginning and end of the line, respectively.

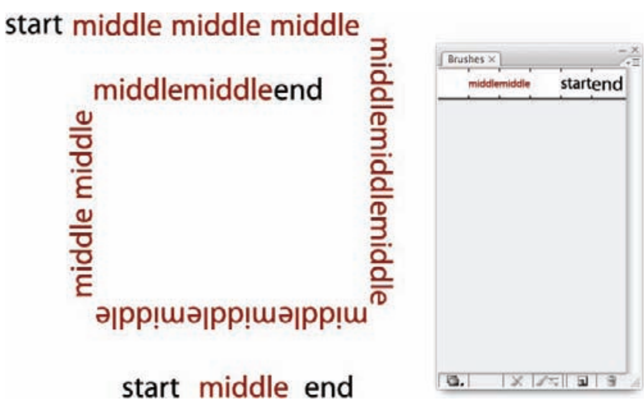


Figure 12.8. Hold the Alt key while dragging the start and end geometry over the definition of the Pattern brush in the Brushes dialog box.

To see how the Pattern brush is used in diagrams, consider the following example:

1. The diagram shown in this figure uses only standard linework at varying weights. The arrowheads are applied as effects (see page 127).
2. To create an arrowhead for a custom line, draw a line with the Pen tool. Select **Filter > Stylize > Add Arrowheads**. By choosing to add the arrowhead as a filter, it can be used as geometry instead of remaining an effect. Arrowheads and the difference between Filters and Effects are discussed in more detail on page 130.

Figure 12.9. The linework in this diagram was created using the Pen tool and applying varying stroke weights. The arrowheads were created using effects that are demonstrated on page 127.

3. Choose the white arrow and select only the line that was originally drawn. Delete that line to leave only the arrowhead remaining.
4. To create a new Pattern brush, drag the arrowhead into the Brushes dialog box.
5. Draw a line using the Pen tool on the diagram where the new linework will be.
6. Select the line and choose the new Arrowhead Pattern brush from the Brushes palette.

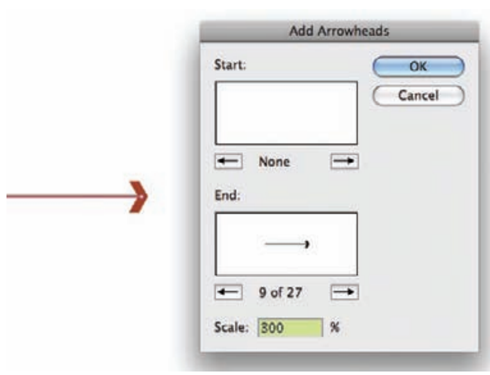


Figure 12.10. To add an arrowhead to a line, go to **Filter > Stylize > Add Arrowheads**. Choose an arrowhead from the list.

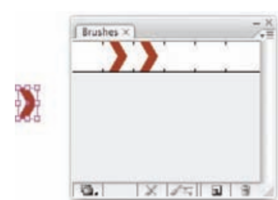


Figure 12.11. After deleting the line attached to the arrowhead, drag the arrowhead into the Brushes dialog box. Choose to create a new Pattern brush.

Figure 12.12. Draw a path using the Pen tool on the diagram. This path is where the new Arrowhead Pattern brush will be drawn.

Figure 12.13. Apply the Arrowhead Pattern brush to the line by selecting the line and then clicking on the Arrowhead pattern in the Brushes palette.

Altering the Pattern Brush

The spacing of the elements, as well as the scale of the brush, can be altered once it has been created. By altering the spacing and scale of the brush, the custom linework can be made to work with other elements on the diagram. To see how to alter the spacing and scale, consider the following example:

1. Double-click the brush that will be altered in the Brushes palette. A dialog box will appear with several options for altering the appearance of the brush. Change the scale and spacing of the brush to see the effects.
2. One thing to consider is that once the Pattern brush has been altered, all of the lines in the drawing that use that pattern will be affected.

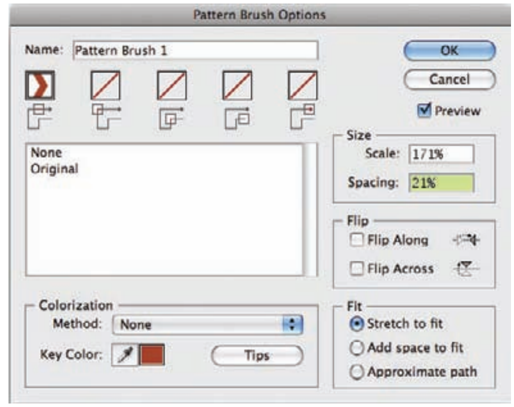


Figure 12.14. Double-click on the Pattern brush in the Brushes palette to bring up the Pattern Brush dialog box. Alter the spacing and scale of the brush in this dialog.

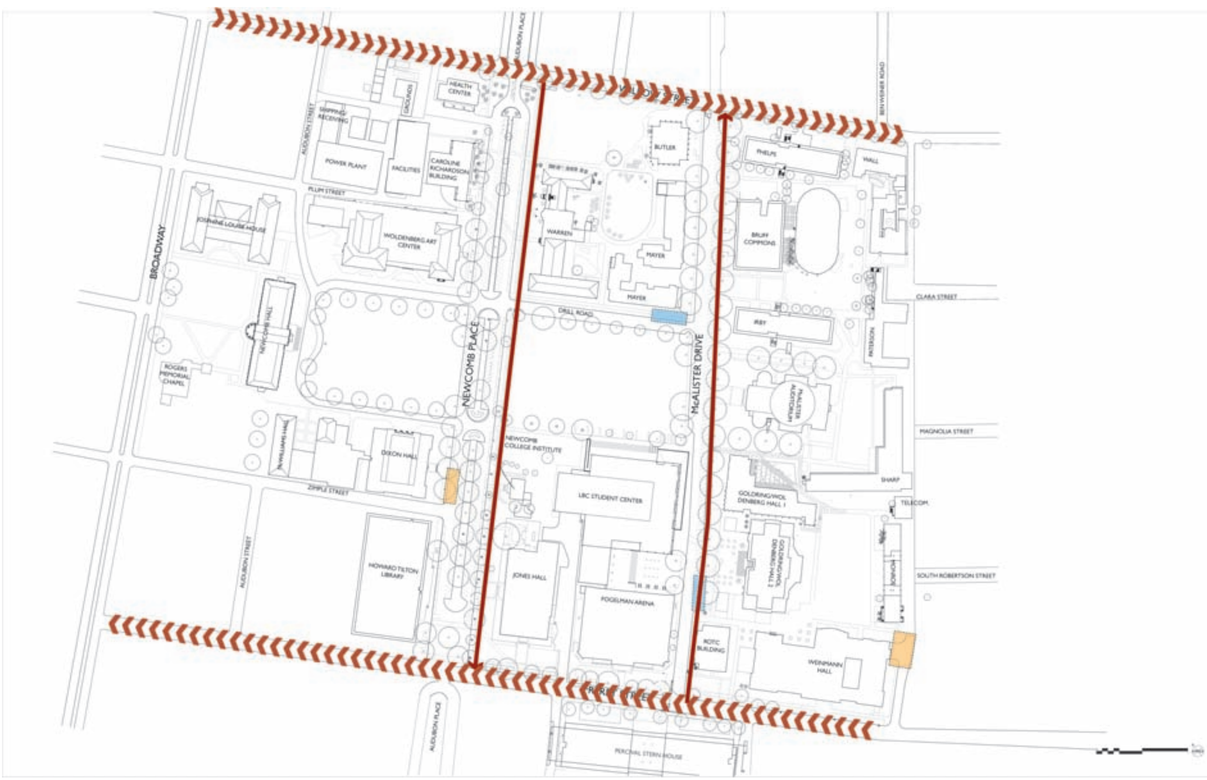


Figure 12.15. The spacing and size of the Pattern brush is applied to lines in the drawing that use that pattern.

Updating the Pattern Brush with New Shapes

Replacing the original geometry with new shapes can change the look of the brush completely. Any single element (such as middle, start, or end) can be replaced individually, or all of the elements can be replaced to create an entirely new brush. To understand how to replace the geometry of a brush, consider the following example:

1. Create a new set of shapes to use in the brush. In this example, the words "SHUTTLE ROUTE" are going to be added to the line. Use the Type tool to create the text. Go to **Type > Create Outlines** to change the text into geometry. More than one element can be used to create a line. Add a line on either side of the text to create the rest of the brush pattern. Select all three objects that will create the Pattern brush and drag them over the original geometry of the brush with the Alt key held down.

Figure 12.16. More than one piece of geometry can be used to create a brush. Drag the text and two lines over the arrowhead while holding down the Alt key. This will replace the arrowhead geometry with the text and lines. The Pattern brush will be redefined.

2. The line will be updated with the new geometry.

Figure 12.17. Once the geometry has been redefined, the linework will be updated.

3. To remove a Pattern brush from a line and return the line to a simple stroke, select the line and choose the Remove Brush button (the icon in the Brushes palette that shows a paintbrush with a cross through it).

Chapter 13
Symbols

Symbols can be powerful tools for working with Illustrator diagrams. They allow you to place a graphic in a drawing and update it later as necessary. A *symbol* is similar to a block in AutoCAD. A symbol has only one definition, a *master symbol,* and any number of copies in the drawing. A symbol is much more than a copy; it can be thought of as a *container* for content. The content (lines, fills, images, etc.) always represents the current information in the symbol library. If the contents of the container are altered, the information is updated throughout every instance of the symbol in an illustration. This makes it easy to update geometry across the drawing at the same time, increasing consistency and saving time.

When copies of a symbol are made throughout a drawing, the contents of each symbol are linked back to the master in the symbol library; however, the container for each symbol's content is a unique object. This means that it is possible to transform each symbol independently by moving, rotating, scaling, tinting, or using any number of other effects. Each symbol will maintain its original content but may be rotated slightly, may be scaled up or down, and may even have a slight tint applied. Transformations can be applied with the normal transformation tools or with a series of tools available in the Symbol Sprayer rollout.

For example, during the early stages of an illustration, it is possible to define a tree symbol simply with a circle. The symbols can be placed throughout the drawing and scaled with slight variations. As the project progresses, the symbol can be replaced with a highly detailed symbol in order to more fully represent the tree species by updating the master symbol in the library. The symbols will be updated, but the position and scaling of each symbol will remain the same. It is possible to test alternatives or to use a simple symbol while working in order to keep the file size down and then replace the symbol before printing or exporting.

Creating Symbols from Custom Artwork

Creating symbols is similar to creating the Pattern brush. Each symbol begins as geometry and is converted to a symbol using the Symbols palette. To create a symbol, first draw the graphic in Illustrator. You can also import lines from other vector applica-

tions, such as AutoCAD, to use as a symbol or import a raster graphic, such as a JPEG or Photoshop file. Consider the following example:

1. To create the symbol, draw or import the artwork for the symbol. In this example, a symbol for information kiosks will be used. Drag the artwork into the Symbols palette. When the dialog box appears, choose Graphic. A movie clip symbol is used for symbols that will be used in Adobe Flash, and using it is not recommended for work in Illustrator.
2. After dropping the graphic into the Symbols palette, the source object automatically becomes a symbol.

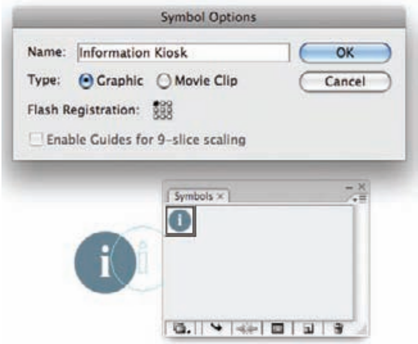


Figure 13.1. To create a symbol, drag the artwork that will serve as the symbol into the Symbols palette.

Using the Move tool, you can copy this symbol to other areas of the drawing, or you can drag the symbol from the Symbols palette to the drawing.

Figure 13.2. Once a symbol is created, drag it from the Symbols palette onto the drawing. The symbol can then be copied around the drawing to place the symbol instances.

If the symbol instance is scaled or rotated, that transformation will not affect the master symbol. Additionally, if an instance has been scaled or rotated and the definition of the symbol is changed, the rotation on the instance will not be affected.

Updating/Replacing Symbols

The advantage of using Symbols instead of simply copying objects throughout a drawing is that a symbol can be replaced throughout the entire drawing. There are two ways to approach this. Redefining the symbol will update all of the symbols in the drawing automatically. This is a good approach if the existing symbol is no longer needed for the drawing. However, if there is the possibility that the symbol will be needed later, a second symbol can be created and all of the existing symbols can be replaced with the new symbol. The advantage of this method is that you can return to the pervious symbol if desired. To understand how this might work, consider the following example:

Figure 13.3. To redefine a symbol, start by creating a new symbol instance.

Figure 13.4. Right-click the symbol and choose Break Link to Symbol. After the link has been broken, the geometry can be altered

Figure 13.5. To redefine the symbol, hold the Alt key and drag the new geometry over the existing symbol in the Symbols palette.

1. To redefine an existing symbol, it is usually easiest to break the link to an instance of the symbol, which will make the symbol into standard geometry again. To do this, drag the symbol from the Symbols palette onto the workspace.
2. To break the symbol instance and return the symbol to standard geometry, right-click on the symbol and choose Break Link to Symbol.
3. Once the symbol link is broken, the symbol graphic can be updated. In this example, the color of the symbol will be changed. However, the symbol can be edited in any way, even with additional new geometry. The symbol may need to be *ungrouped* in order to edit certain parts of the geometry. To do this, right-click the geometry and choose Ungroup.
4. To redefine the current symbol, drag the new geometry over the current symbol in the Symbols palette while holding the Alt key.
5. The symbols in the drawing will automatically update to reflect the redefined symbol.

Figure 13.6. When the symbol is redefined, all of the instances of that symbol are updated.

An alternative method for replacing symbols throughout a drawing is to create a second symbol. The alternative symbol can be swapped for all of the instances of the original symbol. To understand how this technique works, consider the following example:

Figure 13.7. An alternative method to redefining the symbol is to create a completely new symbol and replace that symbol with the new symbol. To do this, a new symbol must first be created.

1. Create an entirely new symbol or, as in the previous example, place an instance of the existing symbol and break the link. In this example, a completely new symbol will be created.
2. To replace all of the instances of one symbol in the drawing with another, select all of the symbol instances that will be replaced. This is easily accomplished via the menu in the Symbols palette. Select the symbol and in the Symbols menu, choose Select All Instances. This will select every instance of that symbol in the drawing.
3. After all of the instances of the original symbol are selected, click the new symbol in the Symbols palette. Go to the menu on the Symbols palette and choose Replace Symbol.
4. The symbols will be replaced throughout the drawing.

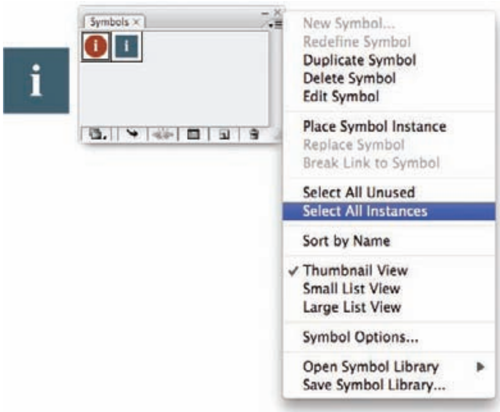


Figure 13.8. To select all of the instances of a symbol in the drawing, go to the Symbols menu. Click the symbol that is to be selected and choose Select All Instances.

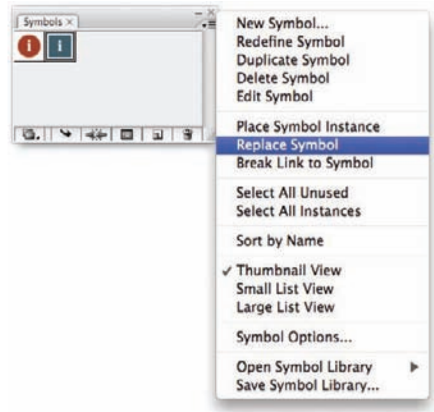


Figure 13.9. After all symbol instances are selected, choose the alternative symbol in the Symbols palette by clicking it. From the Symbols menu choose, Replace Symbol.

Figure 13.10. The symbols will be replaced in the drawing.

Managing Symbols

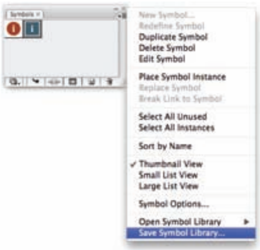


Figure 13.11. Symbol libraries can be saved to use on future projects or share with others working on the project.

After several symbols have been created, they can be saved to a symbol library for future use or to share with other people working on the project. This is an easy way to create a standard set of symbols for an office. To save the symbols, click the drop-down menu on the Symbols palette and select Save Symbol Library.

Creating Clipping Masks for Image Symbols

Using images as symbols can be an effective technique to display graphical information in a diagram. To use an image as a symbol, it is often necessary to crop the image to a certain shape, as in the following figure.

Figure 13.12. The circular images were cropped using a clipping mask in Illustrator. The smaller icons were created in Photoshop and cropped to their circular shape in Illustrator.

A *clipping mask* hides a portion of the image to which it is attached. Each clipping mask is connected to a single object. To understand how clipping masks work, consider the following example:

1. Place an image into Illustrator using **File > Place**.
2. Create a shape to be used as the clipping mask.
3. Select both the image below and the Clipping Mask shape. Go to **Object > Clipping Mask > Make**.
4. The image now has a clipping mask attached to it. The clipping mask and the image can be disconnected from each other by choosing **Object > Clipping Mask > Release.**
5. The image with the clipping mask can be used as a symbol, or it can be used in the diagram as is.

Figure 13.13. This image will be used to create a symbol.

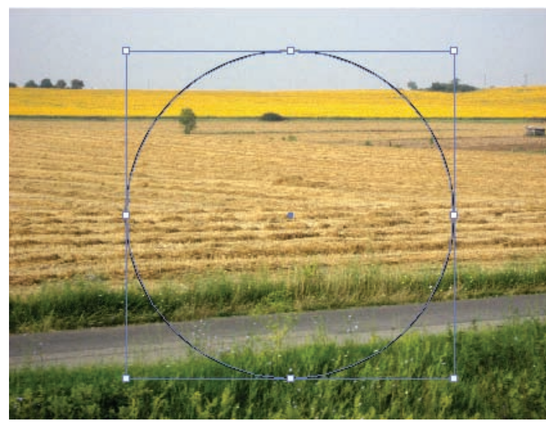


Figure 13.14. Create the object that will serve as the clipping mask and place it over the image. Both the Clipping Mask and the image below must be selected.

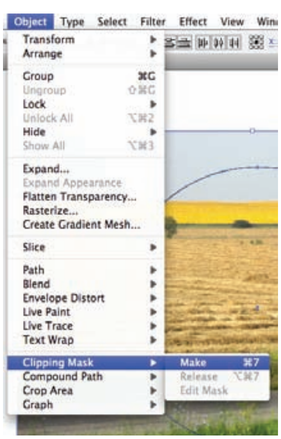


Figure 13.15. Turn the circle on top of the image into a clipping mask by going **to Object > Clipping Mask > Make**.

Figure 13.16. The clipping mask and the image are attached.

Figure 13.17. To create a symbol from the final image, drag the image with its clipping mask into the Symbols palette.

Chapter 14
Text, Leaders, and Page Layout

The text for labels and layouts should be created using a vector-editing application. The tools available in Illustrator work better than raster-based applications such as Photoshop. Raster illustrations can be linked into an Illustrator layout in order to apply titles, leaders, notes, and labels in order to take advantage of the tools that are available in Illustrator. It is also possible to create text directly in Photoshop, and both sets of tools are very similar. Illustrator has a larger set of options, particularly for text windows and text-box linking. Illustrator also has the ability to convert text to vector paths in order to transform characters individually if necessary.

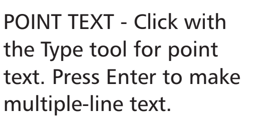


Figure 14.1. Insert point text into the drawing by choosing the Type tool and clicking on the drawing.

Text Tools

Illustrator has two basic Text tools and several other advanced text options. The Type tool is used to create the two most basic forms of text: point text and paragraph text.

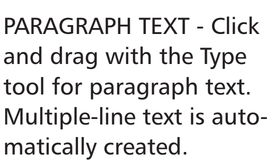


Figure 14.2. Insert paragraph text into the drawing by choosing the Type tool and clicking and dragging a text box.

Point Text

The first method of creating text uses *point text.* To insert this type of text into your drawing, select the Type tool and click on the drawing. As you enter text, the line expands. If you press Enter, a new line will form below. The text box will keep expanding as long as type is added.

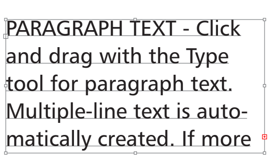


Figure 14.3. A small, red plus sign (+) indicates that there is more text than the text box can hold.

Paragraph Text

A second way to insert text uses *paragraph text*. Insert paragraph text by clicking and dragging to form a text box. The size of the text box will determine the boundaries of the text.

The text box will continue to expand as long as *point text* is being typed. *Paragraph text* will disappear from the screen once the limits of the text box are reached. The text still exists; it is simply outside the parameters of the text box. Once the limits of the

box are reached, a small, red plus mark (+) will pop up at the bottom-right of the text box. This indicates that there is text outside the limits of the box. The text is still there; it can be seen by dragging a corner of the box with the black arrow to make the text box larger.

Differences between Point Text and Paragraph Text

The main difference between point text and paragraph text is how the text is affected when the size of the text box is changed after the text has been entered. With point text, the size and shape of the text changes when the size of the text box is changed. With paragraph text, the font stays the same size and adjusts to the dimensions of the new text box.

Another difference can be seen when the text boxes are rotated. The Point Text box rotates the text, where the Paragraph Text box maintains its orientation and adjusts to the parameters of the box.

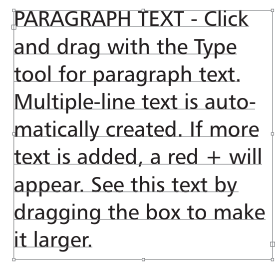


Figure 14.4. To see the text, click and drag one of the corners of the text box to make it larger.

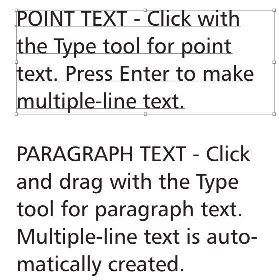


Figure 14.5. Point text and paragraph text differ in the way the text appears when the text box is altered.

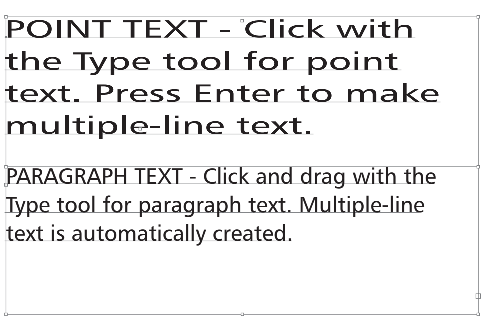


Figure 14.6. When a Point Text box is expanded, the text changes size and shape. When a Paragraph Text box is expanded, the text's font size stays the same but readjusts to fill the dimensions of the new box.

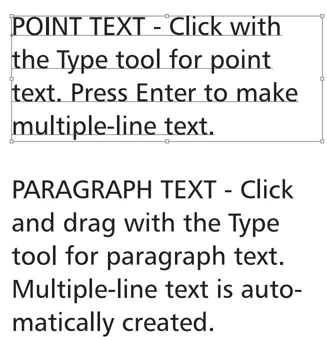


Figure 14.7. Point text and paragraph text also differ in how a rotation affects the text box.

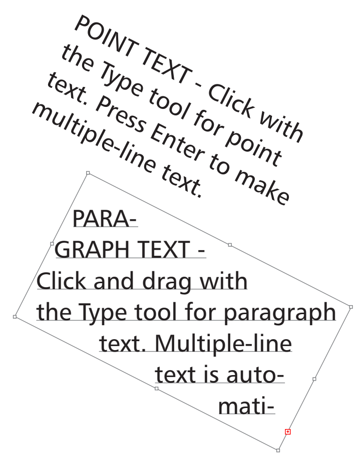


Figure 14.8. The Point Text box rotates the text, while the Paragraph Text box maintains its orientation when the text box is rotated.

Point text is most often used to create labels or other short text items, such as titles, etc. Paragraph text is better used to create longer descriptions. Another feature of

paragraph text is that the text can be linked to flow between two separate text boxes. To better understand the technique, consider the following example:

1. Make two Paragraph Text boxes and enter text into the first Paragraph Text box. Enter more text than the first text box will hold. The red plus sign (+) should appear at the bottom-right corner of the text box.

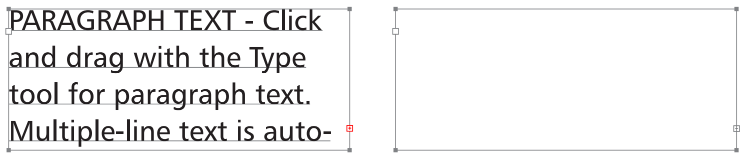


Figure 14.9. Create two Paragraph Text boxes. The text in the first box extends beyond the dimensions of the text box. The red plus sign (+) in the corner of the box indicates that more text is contained in the text box than can be displayed.

2. Click the red plus sign (+) on the first text box and then click in the next text box. The text from the first box will flow into the second box.

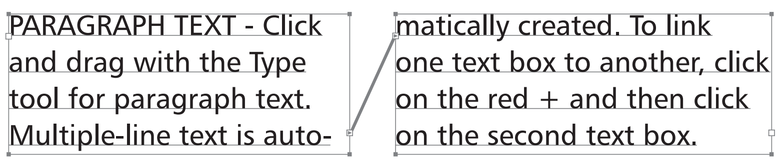


Figure 14.10. Click on the red plus sign (+) and then click in the second text box to link the text boxes. The text from the first text box will flow into the second text box.

3. You can set up multiple text boxes, and copy and paste text from Microsoft Word or any other word processor into your Illustrator file.

Formatting Text

To format text in the text boxes, use one of the Type palettes. This Type palette has several subpalettes. The two most important are the Character palette and the Paragraph palette. The Character palette can be found under the menu item **Window > Type > Character**. The basic feature of the Character palette is the ability to change the font and font size.

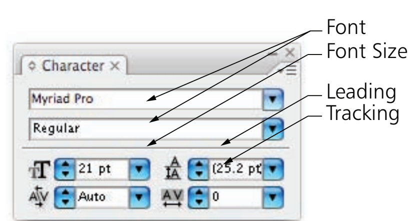


Figure 14.11. The Character palette offers tools for changing the font, font size, leading, and tracking.

The other useful features of the Character palette are leading and tracking. *Leading* changes the spacing between lines of text. *Tracking* changes the spacing between the

characters of the text. To understand how leading and tracking affect text, consider the following example:

1. To use any of the features of the Character palette, the text box must be selected. The leading will change the spacing between lines of text. In this example, the leading has been changed from Automatic, which is 25.2 point, to 21 point. This has the effect of decreasing the spacing between the lines of text.

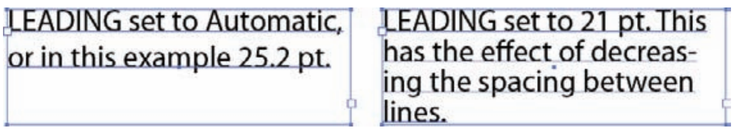


Figure 14.12. The leading is changed from 25.2 point to 21 point. This makes the spacing between the lines closer. Changing the leading to a value greater than 25.2 would increase the spacing between the lines.

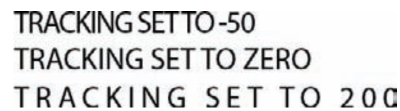


Figure 14.13. The tracking is set to three different values. The tracking changes the spacing between the characters.

2. Tracking changes the spacing between the individual characters. In this example, the same text is copied three times and the tracking is set to three different values.
3. Leading and tracking can be applied to the entire text box, as in the previous examples, or on just certain parts of the text. To affect the entire box, select the text box with the black arrow and change the Leading and Tracking parameters. To change just parts of the text, double-click on the text and select the portion of text to be changed. With this text highlighted, change the leading and tracking.
4. To change the leading between a title and the text that follows it, select the first two lines of text.
5. With these two lines selected, change the leading to a larger value. This will provide a space between the title and the paragraph text that follows it.
6. To change the tracking of just the title, select the title using the Type tool.
7. Changing the font to Bold and adjusting the tracking will set off the title from the rest of the paragraph. In this example, the font was changed to Bold Italic and the tracking was increased to 75.

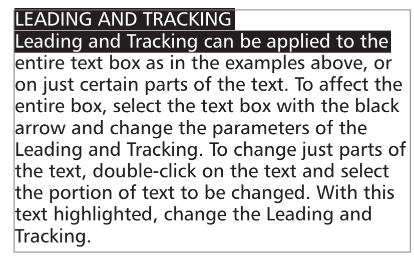


Figure 14.14. To select individual portions of text, double-click on the text box with the black arrow. Selecting the first two lines of the text and changing the leading will customize the spacing between the title and the paragraph text.

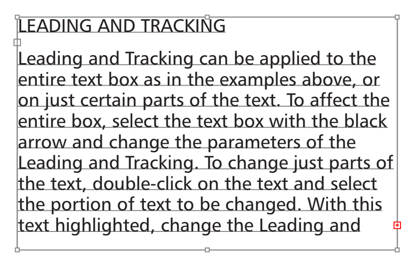


Figure 14.15. When the first two lines are selected, a change in the leading affects only the spacing between these two lines. The spacing between the title and the paragraph text can be customized using this technique. If the spacing is not customized, the spacing between the title and the paragraph is set by pressing Return between the title and the paragraph

The Paragraph palette offers ways to control the *justification* of the text, as well as hyphenation and indentations. The Paragraph palette is found under **Windows > Type > Paragraph**. To change the justification of the text, select one of the options at the top of the palette. The boxes below the justification types will adjust the indentation of the text box. To control the hyphenation of the text within the box, adjust it in the drop-down box from the Paragraph palette.

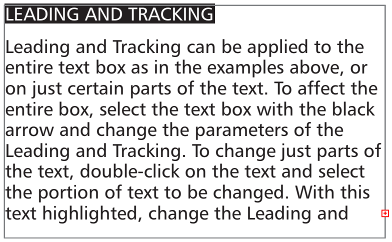


Figure 14.16. The font and other attributes, such as tracking, are changed only on the text that is selected.

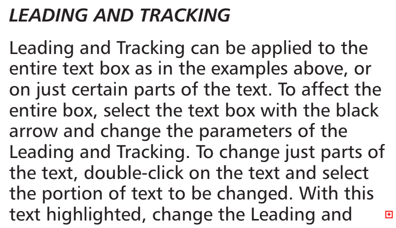


Figure 14.17. In this example, the title was changed to Bold Italic and the tracking was increased to 75. The font size could be changed if desired.

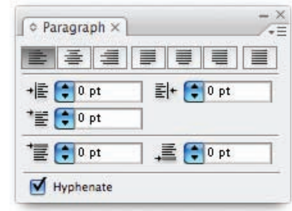


Figure 14.18. The Paragraph palette controls the justification and hyphenation of the text in a text box.

Custom Type Tools

There are several Type tools that provide unique ways to place text into a drawing. These tools offer different techniques for creating vertical text, having text follow a path, and creating text within a custom shape.

The following examples show how these different techniques create custom text:

1. Vertical text can be created by choosing the Vertical Type tool and either clicking (for point text) or clicking and dragging (for paragraph text) in the workspace. The text entered into the text box will be oriented vertically.
2. Text can be set to follow a path created in Illustrator or imported from another vector-based program, such as AutoCAD. First, draw the path for the text to follow.
3. Choose the Type on a Path tool. Select the path and type the text to appear on the path.
4. The text can be altered and transformed like other objects in Illustrator. To change the color, select the text and choose a new swatch.

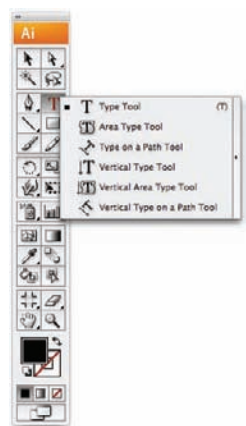


Figure 14.19. Several custom Type tools provide techniques for creating vertical text, creating text that follows a path, and creating text within a custom shape.

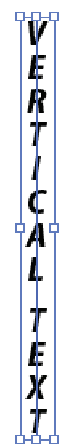


Figure 14.20. When the Vertical Type tool is chosen and placed in the workspace, the text maintains a vertical orientation. Point text and paragraph text can be created using this tool.

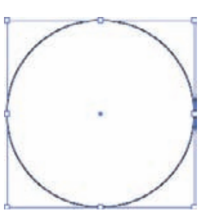


Figure 14.21. To create text that follows a path, first create the path.

5. Text can be created within a custom shape as well. Any shape created with the Pen tool or the Shape tools can be used. Start by creating the custom shape.
6. Select the Area Type tool and click on the custom shape. The text entered into this shape will follow the dimensions of the shape, similar to a regular text box.

Figure 14.22. Choose the Type on a Path tool and select the path the text will follow. The original path will disappear after the text is added.

Figure 14.23. The text and the path can be copied and manipulated like other geometry.

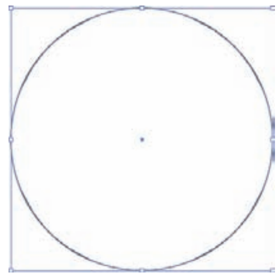


Figure 14.24. To use the Area Type tool, first create a custom shape using either the Pen tool or the Shape tools.

Figure 14.25. Select the Area Type tool and click on the shape. The text entered into the shape will follow the shape, similar to a regular text box.

Creating Text with a Clipping Mask

A useful technique for creating text in combination with an image is to use a clipping mask with the text. Clipping masks are discussed further on page 118. To see how text can be created using a clipping mask, consider the following example:

1. Place an image into Illustrator. Create the text to be used over the image.
2. Transform the text into geometry by selecting the text and choosing **Type > Create Outlines**.
3. Ungroup the text. When text is converted to outlines, it is grouped together to allow the text to be moved easily. However, for this technique, the text needs to be ungrouped.

Figure 14.26. Place the image and place the text to be used over the image.

Figure 14.27. Select the text and choose **Type > Create Outlines.**

Figure 14.28. The text will be placed into a Group. Right-click the text geometry and choose Ungroup.

4. The text must be turned into a *compound path*. When the text is ungrouped, each individual letter is turned into an individual object. To make a clipping mask, all of the letters need to be a single path. To change the text into a compound path, select all of the letters and choose **Object > Compound Path > Make**.
5. Select the image and the text, which is now a single compound path, and choose **Object > Clipping Mask > Make**.

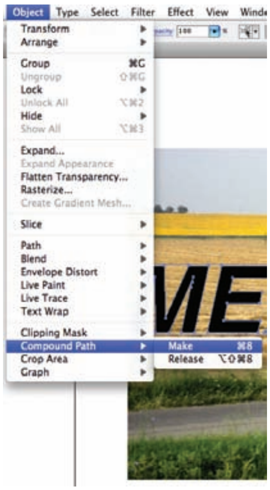


Figure 14.29. All of the letters need to be turned into a single path to make the clipping mask. Select all of the letters and choose **Object > Compound Path > Make**.

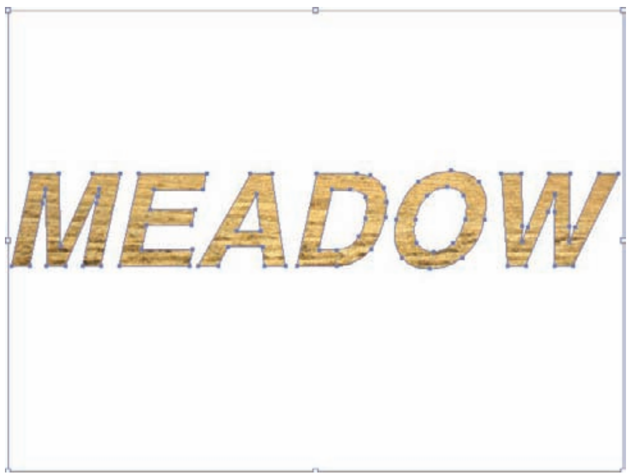


Figure 14.30. Select both the image and the compound path of text and choose **Object > Clipping Mask > Make.**

6. To add an outline to the text, select the text. Notice that the Stroke is empty in the color swatch. Choose a color and weight for the Stroke in the color swatch to make an outline of the letters.

Figure 14.31. The text does not have a stroke applied.

Figure 14.32. To create outlines of the letters choose a Stroke color and weight.

7. The final text is not editable because it was turned into outlines.

Figure 14.33. The final text has the image behind it, and a stroke is applied to the edges.

Leaders

Creating *leaders* in Illustrator is much simpler and more flexible than creating them in Photoshop. Leaders can be created from a combination of a text box and a line with the Arrowhead effect on it. The leaders in Illustrator are easy to move once they are created on the page. The techniques for creating leaders in Illustrator are demonstrated in the following example:

1. To draw a leader, first create a text box and add text. Draw a line from the text to the part of the drawing the label references.
2. Choose **Effects > Stylize > Add Arrowheads** to apply the arrowhead. There are a number of arrowheads from which to choose. The scale of the arrowhead is related to the thickness of the line, or *stroke.* An arrowhead on a line with a 7-point stroke will be larger than an arrowhead on a line with a 1-point stroke.
3. After the leader has been created, its position can be changed easily. To move the entire leader and text, select both with the black arrow and use Move/Copy.

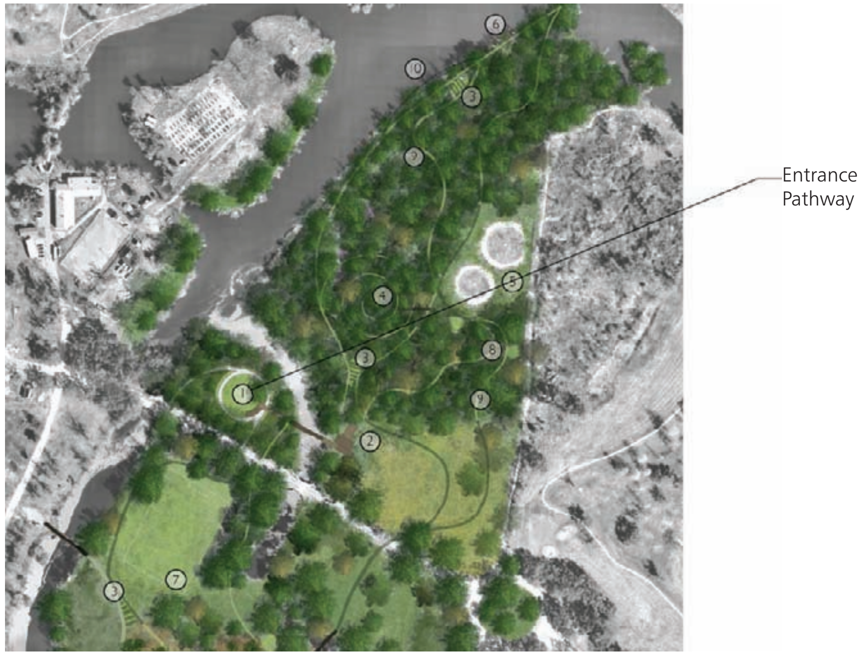


Figure 14.34. Draw a line from the text box to the reference area on the drawing.

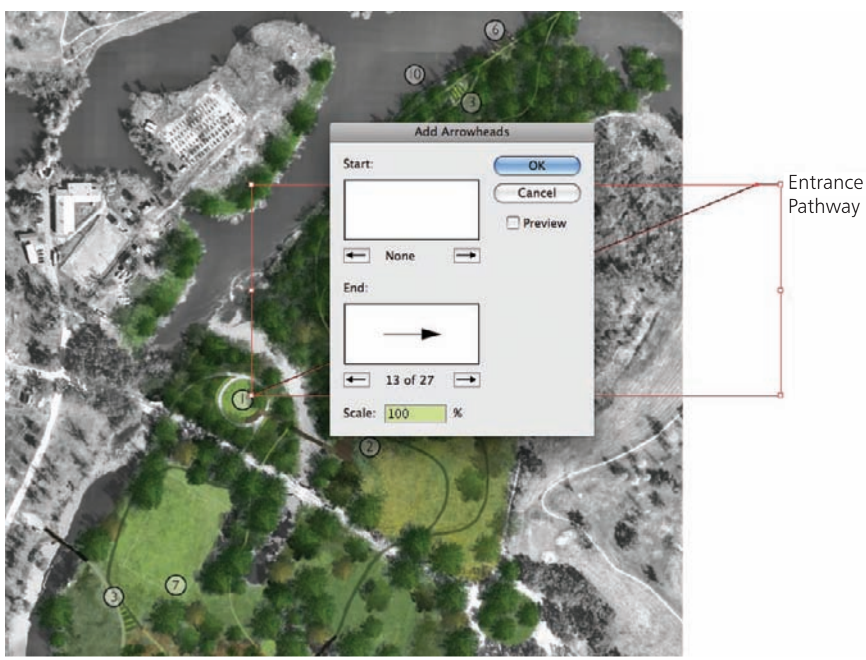


Figure 14.35. There are several arrowhead options from which to choose. The size of the arrowhead is related to the stroke weight of the line. The arrowhead size can be adjusted using the Scale option.

4. To move the text only, use the white arrow. This technique moves the text and the end of the leader together, while keeping the reference arrow in place.
5. First, select the tip of the leader line and the text box. Then, while holding the Shift key, select the text box.

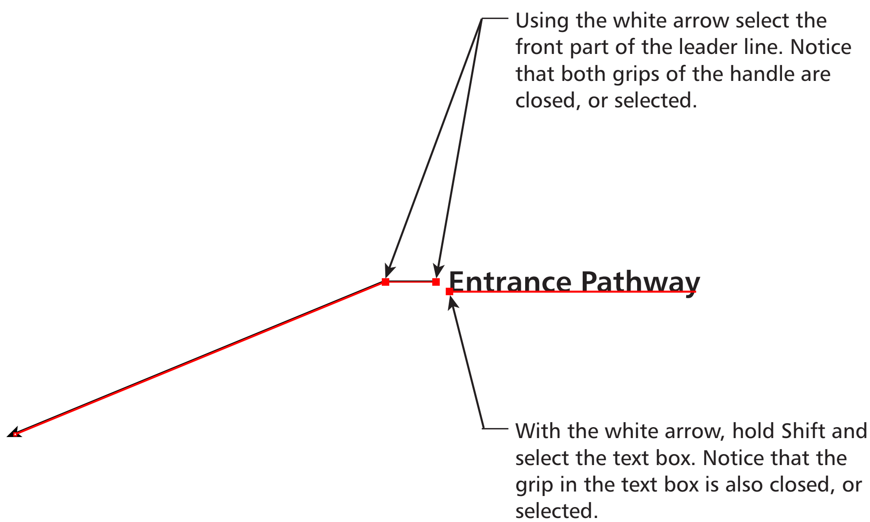


Figure 14.36. To move only the text and have the reference arrow remain in place, select the tip of the lead and the text box together.

6. Use the white arrow to move the text. When the text is moved, the arrowhead stays in the same place, but the text and the rest of the leader will move. This makes it easy to reposition text dynamically on a drawing as you add more leaders.
7. To create a two leaders, use the white arrow to select the leader line. Click on the endpoint of the leader and begin to drag it to another part of the drawing. While the line is being moved, hold the Alt key. If the Alt key is pressed before the line is moved, the technique will not work.

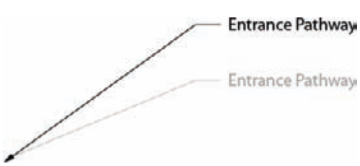


Figure 14.37. Using the white arrow, move the text. The leader will reposition itself with the new placement of the text while the reference arrow will remain in its original position. The gray text/leader in the figure is the original position of the text/leader before being moved.

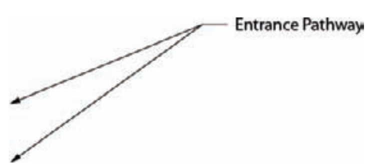


Figure 14.38. Hold the Alt key while the leader is in the process of being moved. If the Alt key is held down before then, the technique will not work.

Effects versus Filters

The Illustrator menu bar contains two menus: the Effects menu and the Filters menu. Many of the options under Effects and Filters are similar. For example, the Effects and Filters menus both have options for **Stylize > Add Arrowheads**.

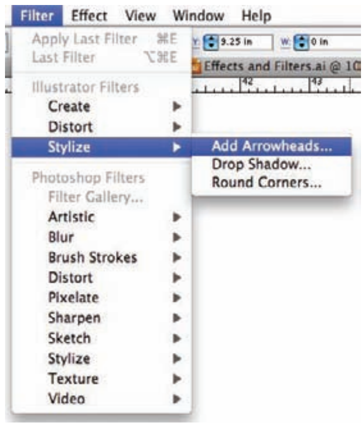


Figure 14.39. The Filters menu has many of the same options as the Effects menu. For example, the Add Arrowheads command appears in both.

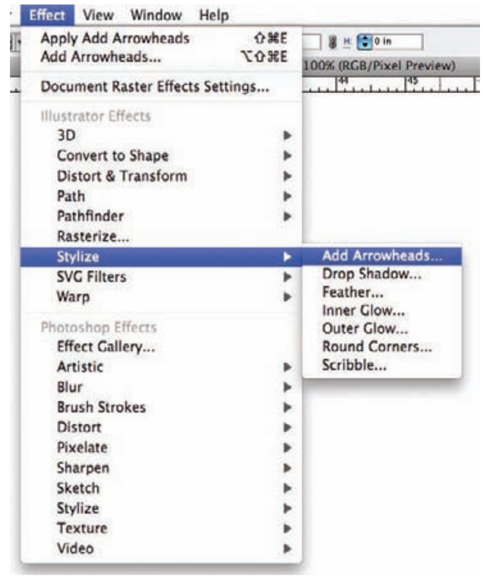


Figure 14.40. Effects are easier to alter than filters.

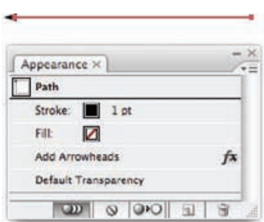


Figure 14.41. If arrowheads are applied as an effect, they will show up in the Appearance palette. The parameters of the arrowhead can be changed by double-clicking the Add Arrowhead option in the Appearance palette. The arrowhead also can be removed from a line by deleting the effect in the Appearance palette.

The difference between the two is that effects can be altered or removed from a line. *Effects* are graphical representations added to the underlying geometry, similar to stroke color, stroke weight, or transparency. Effects will appear in the Appearance palette if an object that has an effect is chosen. *Filters* do not appear in the Appearance palette because they are new geometry.

You can alter the effects from the Appearance palette. The line with the effect applied to it has an arrowhead effect added to it. The Add Arrowhead effect can be altered or removed from the Appearance Palette by double clicking on the effect.

Filters actually create new geometry. Once a filter has been applied, the shape has its own geometry. This geometry can be edited or deleted, but it cannot be changed. See previous page for an example of how a filter is used to create an arrowhead. It is usually better to use effects, as they are more flexible. Filters can be useful when you want to edit a shape, for example, to remove the line that leads to the arrowhead.

Layout

Illustrator offers some useful techniques for laying out graphics and images on a board. These tools can be used to diagram or to lay out a presentation board with plan, section, and perspective images.

Figure 14.42. Illustrator offers some useful techniques for laying out graphics on a board. This figure has images created in Photoshop and Illustrator, as well as site images arranged in Illustrator. Text and leaders can be added in Illustrator once the layout has been set.

One technique that is worth mentioning is linking Photoshop files into Illustrator. See page 92 for more information on how to link Photoshop files into Illustrator. When files are linked, the layout board can be arranged before the Photoshop files are completed. This offers the opportunity to see how individual drawings will look at the size they will be displayed at on the board earlier in the process. As the Photoshop files evolve, they will be updated in the Illustrator layout.

The most useful tool for layout is the Align palette. This set of tools will line up and space images in a number of ways. The following examples show how the Align palette is used:

1. Place the images to be used in the layout into Illustrator.

Figure 14.43. Place the images that will be in the layout on the workspace in Illustrator.

2. Open the Align palette from **Windows > Align**. The align options work in a similar way to text justification in word-processing programs. Vertically, the objects can be aligned to the left, to the center, or to the right. Horizontally, the objects can be aligned to the top, to the center, or to the bottom. When clicked, the Distribute Objects icons will space the objects equally between the two outer objects.

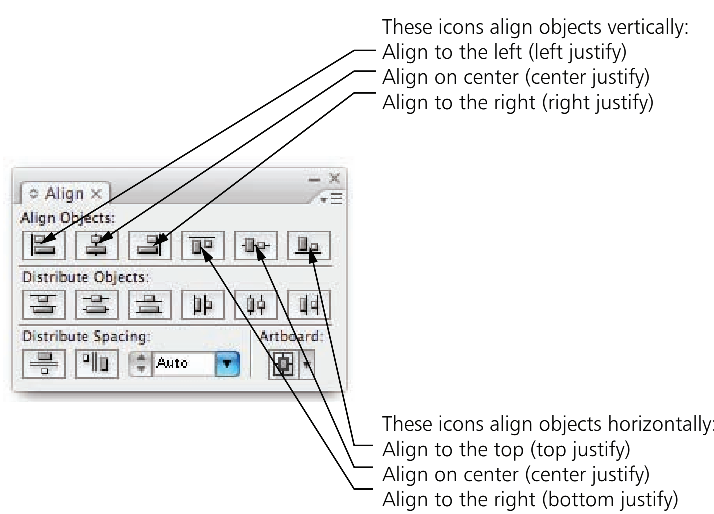


Figure 14.44. The Align palette offers several options for aligning images both horizontally and vertically. It also has Distribute Objects icons, which can be used to evenly space the images.

3. To align the images for layout, select all the images and choose to align horizontally along the center.
4. The objects will be aligned along the center axis. When Center Justify is chosen, the objects align along an axis that is the center of all the objects in the group.

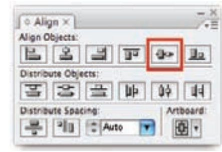


Figure 14.45. Center justify the images from the Align palette.

Figure 14.46. The objects are aligned along the central axis.

5. To space the objects evenly, click the Distribute Objects icon. This will space the objects evenly between the outer two objects.

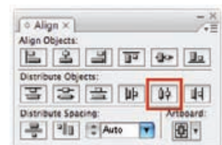


Figure 14.47. Click the Distribute Objects icon to space the objects evenly between the two outer objects.

Figure 14.48. The objects are spaced evenly.

Chapter 15
Exploded Axonometric Diagrams

The distillation or culling of information can often lead to diagrams that are void of contextual references. It is possible to represent the context throughout each diagram in order to provide a reference, tying the unique information from each diagram together. It is also possible to create exploded *axonometric diagrams,* which are useful to show multiple layers of information and how they relate to one another spatially. An exploded axonometric drawing pulls the information apart vertically in order to maintain a reference between each component of a site. This provides a space for each layer of information, while maintaining a clear spatial relationship among individual parts. Lines may be drawn in order to link upper and lower layers, linking edges or points that are critical between each layer.

Creating an Exploded Axonometric Diagram

Several methods are used to create drawings similar to exploded axonometric diagrams. The most common method is to create the diagram from a layered plan drawing. The basic elements of the exploded axonometric diagram are placed on separate layers of the drawing, and each layer is stacked on top of the layer underneath. The following example shows a technique for creating these diagrams:

1. Start with a plan view of the project. Collect all of the elements that will be in the diagram into a single file. Each layer in the diagram should reside on an individual layer in Illustrator.
2. Select the entire drawing by pressing Ctrl+A. Make sure that all layers are unlocked. Rotate the drawing to approximate the final orientation of the diagram.

Figure 15.1. Collect all of the elements that will be in the diagram into a single plan drawing. Place each layer in the drawing on a unique layer in Illustrator.

Figure 15.2. The four elements that will create the diagram are on separate layers.

Figure 15.3. Select all objects in the drawing. Make sure the layers are not locked.

3. The blue line is the *bounding box*. The bounding box is the master editing box that contains all of the selected objects. It appears only when the black arrow is being used to move or transform objects. It allows the user to transform multiple objects simultaneously. Depending on the settings, the bounding box may not "reset" to an orthogonal position after items are rotated. If the bounding box does not reset, with all of the objects selected, go to **Transform > Reset Bounding Box**.

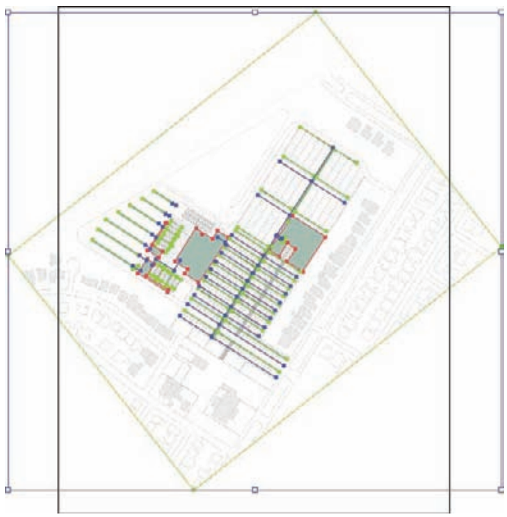


Figure 15.4. Rotate the objects to the proper orientation.

4. Using the black arrow, click and drag the top-center grip to flatten the plan view.

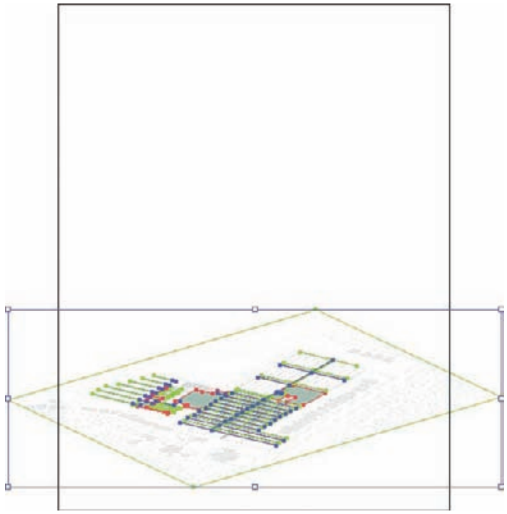


Figure 15.5. To flatten the drawing, grab the top-center grip and drag it downward.

5. To move them to the top of the layer stack, select the objects on the top layer of the diagram and use the Move tool while holding the Shift key. To select all of the objects on a single layer, click in the far right area of the layer box.

Figure 15.6. To select all of the objects on a layer, click in the far right portion of the layer list. The blue box will indicate where to click.

6. Repeat the process for the other layers in the drawing.

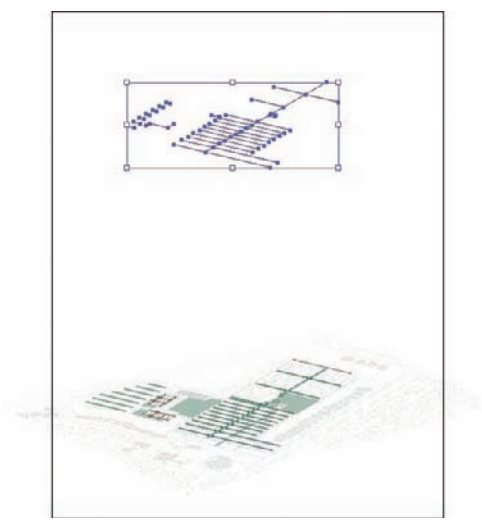


Figure 15.7. Hold the Shift key and use the Move tool to position the layer in the drawing.

Figure 15.8. Repeat the same process for the other layers in the drawing.

7. Adding vertical lines often helps ground the layers above the base.

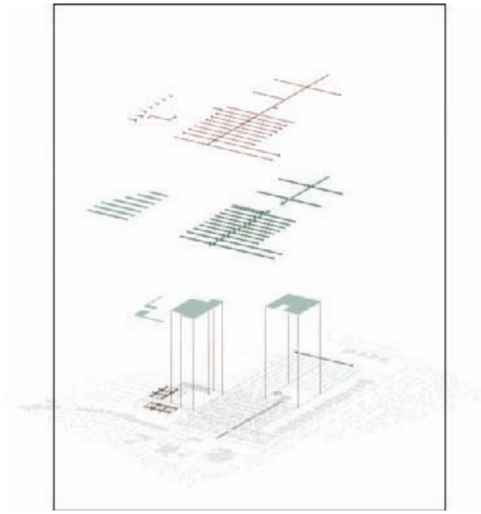


Figure 15.9. Adding vertical lines helps ground the floating layers to the base.

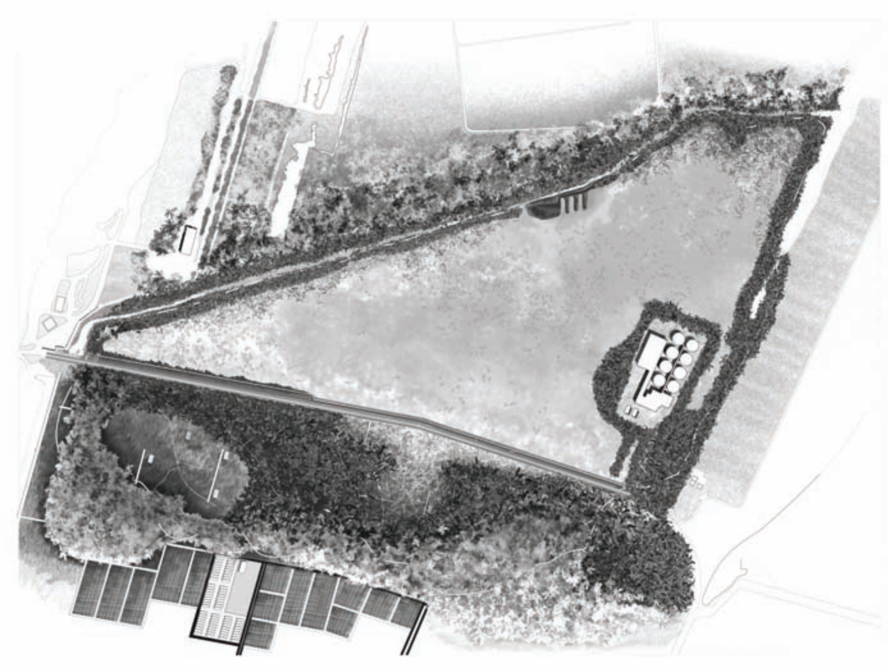
Part 4
Plan/Section Renderings

Madrid Urban Concourse Park Competition, Madrid, Spain; site plan.

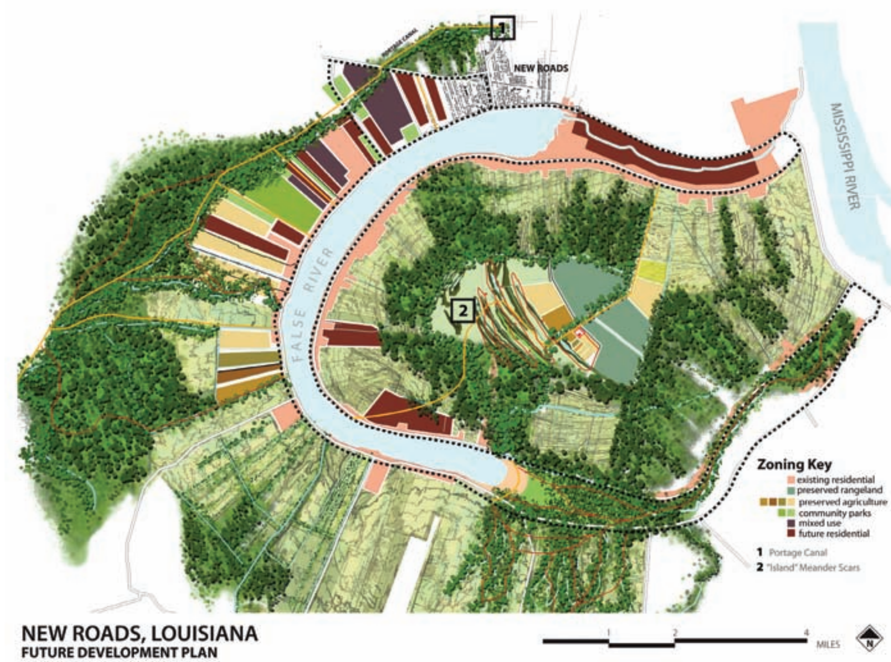
Couturie Forest, City Park, New Orleans, LA; site plan.

Lower Ninth Ward, New Orleans, LA; site plan.

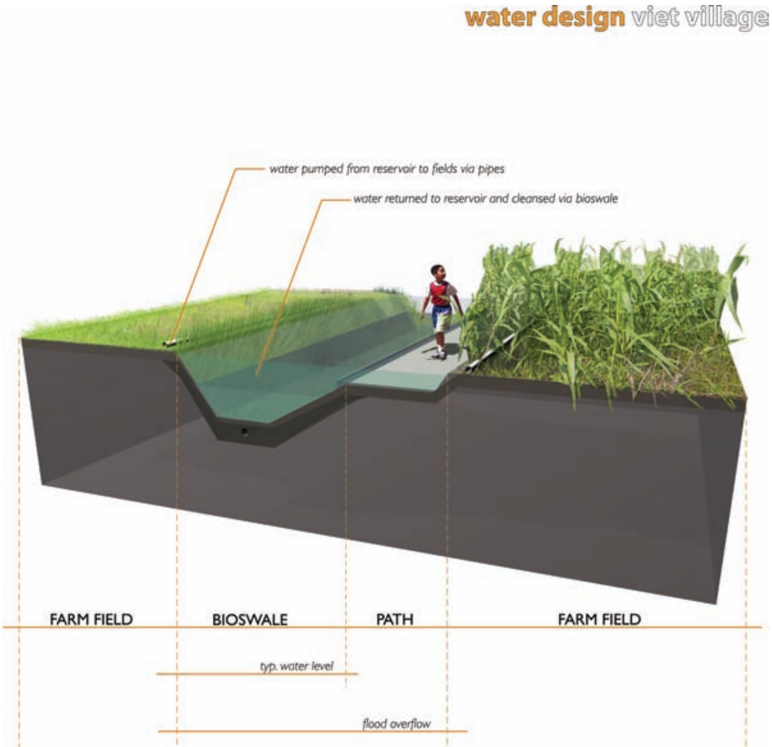
Bayou Bienvenue, New Orleans, LA; elevations.



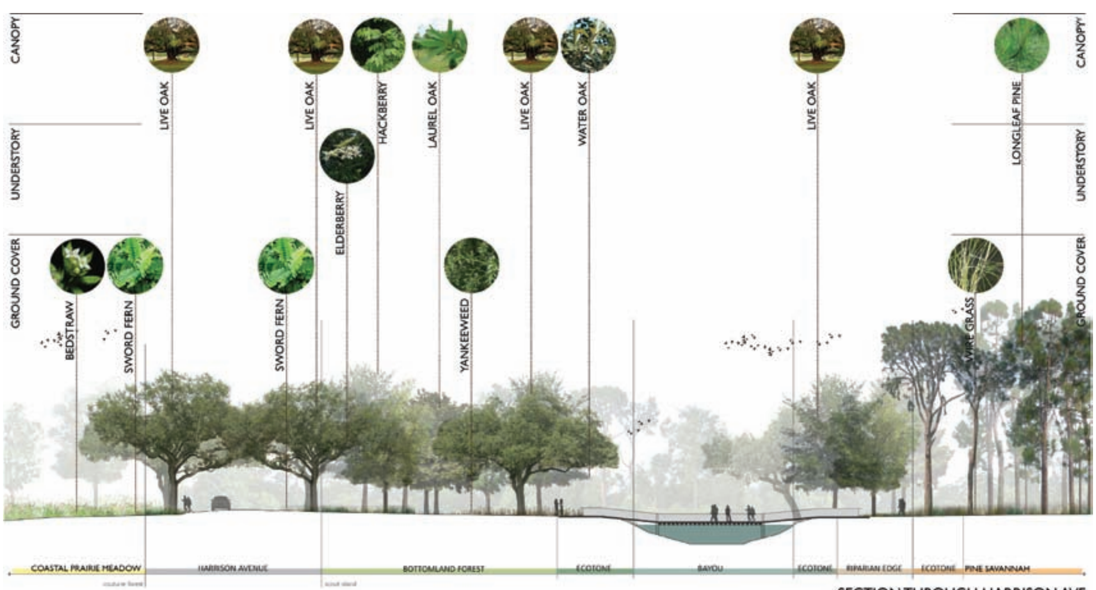
Bayou Bienvenue, New Orleans, LA; site plan.



Pointe Coupee, New Roads, LA; masterplan.



Donnelly Park, New Orleans, LA; site section.



Couturie Forest, City Park, New Orleans, LA; Ecosystems Section Elevation

Couturie Forest, City Park, New Orleans, LA; Canopy Walk section elevation.

Viet Village Urban Farm, New Orleans, LA; section perspective.

Chapter 16
Introduction to Renderings

Figure 16.1. AutoCAD and Photoshop site plan; Soundview Park, Bronx, NY.

Plans and sections are the quintessential design drawings, providing measured, orthographic, and scaled representations of a site or building. Because they are so widely understood and adaptable, the plan and section are deployed at nearly every phase of the design process. The plan or section is essentially an orthographic projection of a site's surfaces that unambiguously represents measured spatial conditions. The plan and section are often the truest representation of architectural spaces, although they employ recording methods that are devoid of the norms of human perception.

The *landscape plan* represents the environment from an aerial view as a measured scaled space. The plan does not typically cut through elements, but instead looks directly down on the site to view tree canopy, building rooftops, and the ground plane below. This form of representation excels at exploring spatial relationships between the ground plane, vegetation, and/or architecture. The plan can be an exacting tool of precision in order to document, unambiguously, what will be built, or it can embody the gestures of a design concept.

The section and elevation are the fundamental architectural drawings that let a designer understand the vertical scale of spaces. The *section* represents a continuous cut through the landscape and all of the elements that occur along the cut line. The section particularly illustrates the relationship of landscape to the ground plane. A section can be a straight line through a site or may turn in order to capture as much as possible. Because the section's location in the site can be ambiguous, it is always necessary to clearly mark it within an associated site plan.

Elevations represent views from the edge of the site or from a section cut line beyond. When based on a section cut line, the elevation is often referred to as a *section-elevation.* The elevation represents everything from the cut line, or edge, back into the distance. Elevations are excellent analytical tools to explore a space's

scale, both vertically and horizontally. The cut line location of a section-elevation needs to be marked, but an elevation can be designated by the direction it is viewing, for example "Elevation North."

Figure 16.2. AutoCAD and Photoshop section-elevation, Perkins Road underpass, Baton Rouge, LA.

Design Process

In the early stages of the design process, analysis and site definition normally rely on the plan for mapping or spatial analysis. As a recording tool, the plan provides a high degree of accuracy and precision in order to map known site features. Plans are also deployed at early stages when developing conceptual diagrams or design sketches. It is important that site representation not be limited solely to the plan in the early stages of the design process. Sections and elevations can be used to map or illustrate existing conditions and test concepts postulated in the plan. The plan will inform the elevation, and explorations in elevation should come back to inform the plan.

During design development, orthographic drawings play a significant role in communicating design intent. The plan typically is used as the centerpiece, annotated and expanded through sections and elevations. In most cases, care will be taken to render the plan in order to represent pragmatic items such as architecture, materials, and vegetation, as well as experiential qualities of the site. The plan, section, and elevations no longer inform one another, but instead create a clear representation of the proposed design concept.

During construction documentation, the plan and section become legal documents, intended to precisely represent the environment that will be built. The drawings must communicate information without any room for interpretation. A line in the drawing represents an edge of an object or condition that will be constructed in the real world. The plan and associated sections and elevations must represent every aspect of the site in order to be completely unambiguous.

Issues in Digital Media

When orthographic drawings are being created with analog media, a physical scale is determined and the drawing is crafted at a specific size. This allows the designer to understand the amount of detail necessary to represent the site and add or subtract

as necessary. When the drawings are physical entities, it is easy to step away from the drafting table or pin the work up on a wall in order to evaluate how well the drawing communicates.

Digital media is different in this regard, as the workspace is a virtual space with a tenuous tangible relationship to the real world. Applications such as AutoCAD allow the designer to work in real-world units in order to create models at 1:1 that can be viewed at any scale or from any vantage point. Photoshop and Illustrator create representations of the real-world output. It is important to know what the output size will be for the drawing as it is being created. In many cases, it is easy for a designer to focus on details that will not be readily apparent when the illustration is printed or to lack the necessary details to properly represent a space. It is advisable to run test prints, especially for novice digital artists in order to comprehend what the final results will be.

Figure 16.3. AutoCAD and Photoshop site-plan texturing, Bedford, MA.

Illustrative Components

The plan follows most conventions of graphic or illustrative standards in order to create depth, materiality, and experience. Depth can be represented through a variety of methods including lineweights, saturation, and screening. Typically, objects that are the closest to the viewer will have the strongest lineweights and will be more saturated in color. This can vary slightly in a landscape plan, as it may be necessary to render vegetation canopies slightly transparent in order to clearly represent the conditions on the ground plane below. Simple shading on the shadow side of edges, vegetation, or architecture will begin to articulate the complexities of a three-dimensional landscape. The sense of depth can also be heightened with consistent shadows, where the length of the shadows are proportional to the elements casting the shadows.

Figure 16.4. Illustrator site masterplan, Los Angeles Riverwalk.

Materiality refers to the process of representing a surface's material qualities with textures and shading. The scale of a material's texture is the most important component to convey a surface's materiality. If the texture is over- or under-scaled, the viewer has a hard time comprehending the actual relationship between adjacent components. Poorly scaled textures also create confusion in the scalar dimensions of a space, negating proportional relationships that may be interpreted from the plan.

Experience is a much more ambiguous element when a site is being represented, but it should not be overlooked. It is important to pick up on the contextual qualities of the environment. When the experiential qualities of a site are being incorporated, it is important to clearly focus on a theme or topic. As an example, if the site being illustrated is a post-industrial brownfield that historically supported heavy industry, it might be appropriate to incorporate textures from site photographs depicting industrial decay. As another example, if the design proposal focuses on the manipulation of light, it might be appropriate to exaggerate the effects of light and shadow within the rendering in order to convey this experience.

Figure 16.5. AutoCAD and Photoshop site plan, Palmer Park, New Orleans, LA.

Chapter 17
Importing PDF Linework

In order to develop a measured, scalable illustration, designers need to develop a method to transfer linework from a drafting (CAD) application to an illustration application such as Photoshop. Although there are plug-ins and applications that allow drawings to be illustrated directly in CAD software, the most common method is for the linework produced in AutoCAD to be rendered in Photoshop. Photoshop offers a more robust set of rendering tools than any integrated representation system, such as AutoCAD plug-in or Vectorworks. In many workflows, CAD and illustration work is divided among staff members, departments, and even outside contractors. Because many people will use the same base linework, it is important to develop a standard approach to exporting linework from a CAD application.

The most common workflow is to print from AutoCAD to the PDF format and then to import or rasterize the PDF file into Adobe Photoshop. This method works well and is transparent for many scenarios because printing to a PDF adopts standards similar to what would be in place to print to paper, such as sheet sizes, lineweights, and scales.

Typically, linework in the CAD application will be organized to make the rendering process as easy as possible. This will include printing several PDF files, each containing separate linework that will then be layered in Photoshop. In order to increase the editability of the drawing, it is normal to print PDF files for vegetation, scoring, layout, text, topography, and utilities. This method makes choosing the areas in the drawing that will receive color much easier in Photoshop. Exporting the entire drawing as a single PDF increases the amount of time needed to color the drawing once in Photoshop.

Exporting multiple PDFs for use in Photoshop has the additional advantage of making editing easier at later stages in the project. If changes occur in the planting plan, it is then possible to simply reprint the vegetation layers and insert them into Photoshop, while leaving the rest of the drawing unchanged. This type of flexibility is one of the advantages of using digital media for representation as opposed to hand rendering.

PDF Linework

Printing a PDF file for every CAD layer is not necessary; instead, layers can be consolidated to make rendering easier in Photoshop. Each file will have a unique set of layers that can be consolidated. The key concept for grouping layers is to separate layers that have a lot of overlapping areas. For an example of how to set up a drawing in AutoCAD for exporting PDFs, consider the following:

1. The drawing in *model space* will be exported using the Paper Space tabs. The original drawing has many overlapping elements.

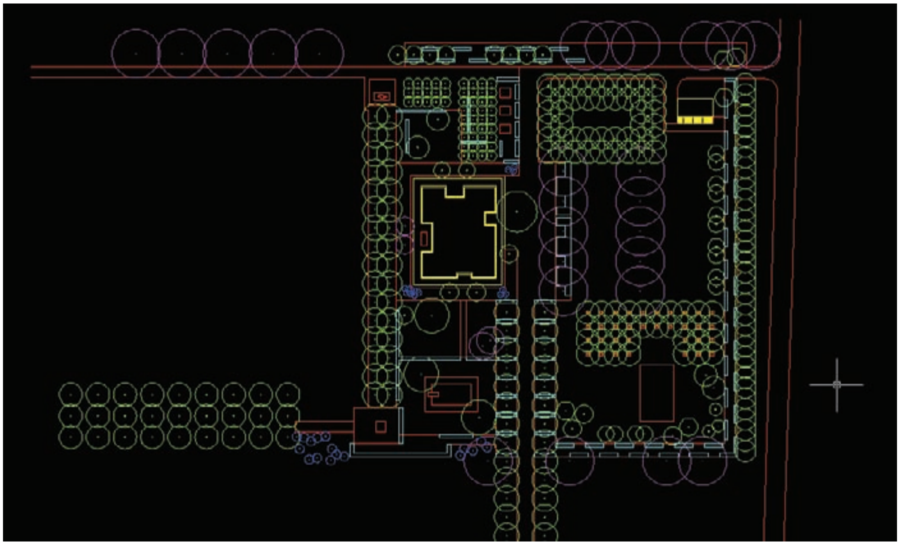


Figure 17.1. The drawing in AutoCAD, as seen in model space.

2. Create a Paper Space sheet layout at the correct size and scale of the final rendering. If the final rendering is to be 24″ × 36″ at 1″ = 50″, set the Paper Space tab to these same dimensions. In this example, the page is set to 8.5″ × 11″. Once the PDF is exported and opened in Photoshop, the size and the scale of the drawing will be the same as the Paper Space tab. Once the Paper Space tab is set up with the proper page size and scale, lock the viewport so all of the PDFs will line up in Photoshop. Locking the viewport keeps the image from moving around on the page. To lock the viewport, select the viewport and choose Lock Display from the Properties tab.
3. After creating the first Paper Space tab, copy the tab to create new Paper Space tabs. Create one Paper Space tab for each PDF that will be brought into Photoshop.

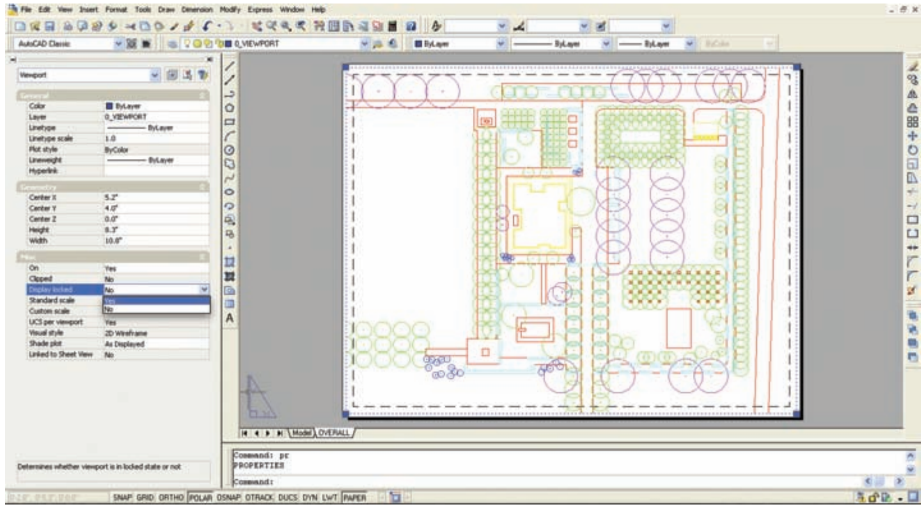


Figure 17.2. Set the Paper Space sheet layout to the dimensions and scale of the final rendering. These attributes will be the same in Photoshop once the PDFs are imported. The Properties tab has an option to Lock the Viewport.

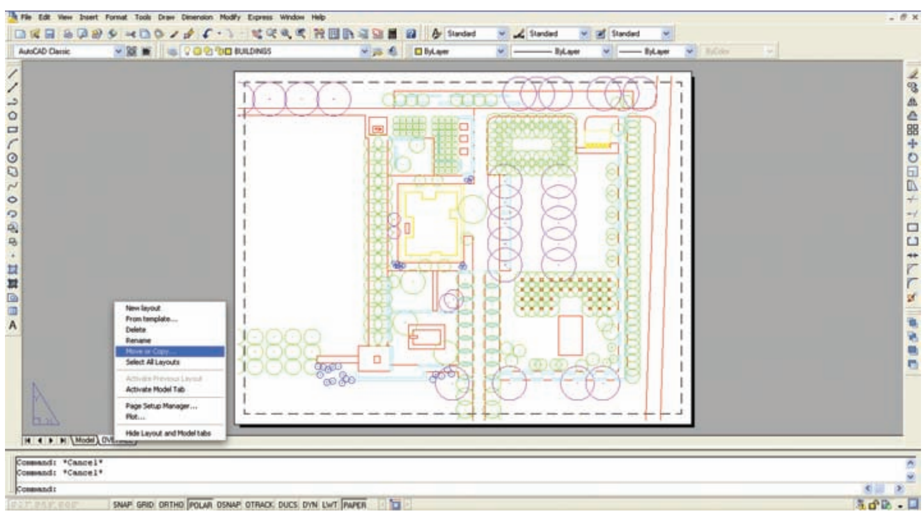


Figure 17.3. Copy the first Paper Space tab to create new sheet layouts. Each exported PDF will have a Paper Space tab.

4. To isolate the linework in each new Paper Space tab, freeze the layers in that viewport only. This will not freeze the layers throughout the drawing; it will freeze only the layers in the viewport on that Paper Space layout. To freeze only these layers in this viewport, double-click the viewport to go to Model Space, open the Layer Properties Manager, and choose Current VP Freeze.

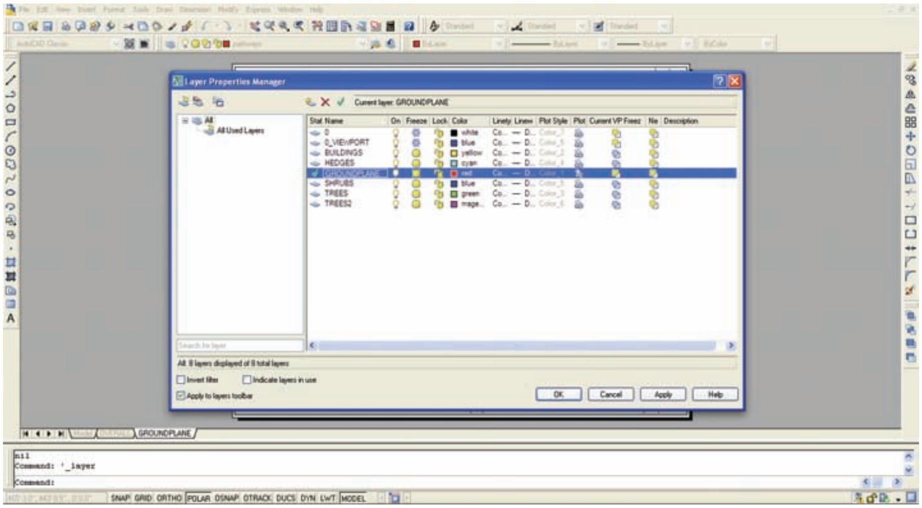


Figure 17.4. To freeze layers only in the current viewport, open the Layer Properties Manager and select Current VP Freeze.

5. Once the other layers are frozen, only the linework that will be exported as a PDF remains in the viewport.

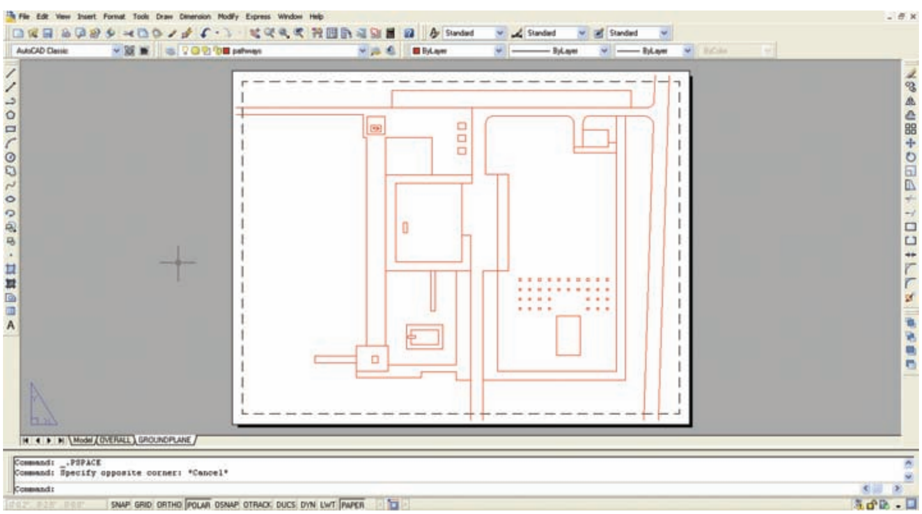


Figure 17.5. The linework remaining will be exported as a PDF and used in Photoshop.

6. Continue to create Paper Space tabs until all of the linework that needs to be isolated is on an individual Paper Space tab.

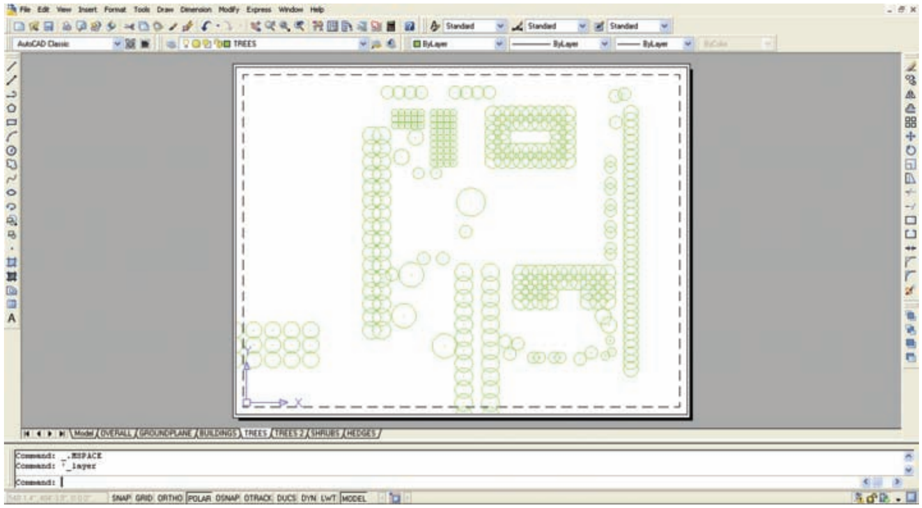


Figure 17.6. Continue to create Paper Space tabs and isolate linework.

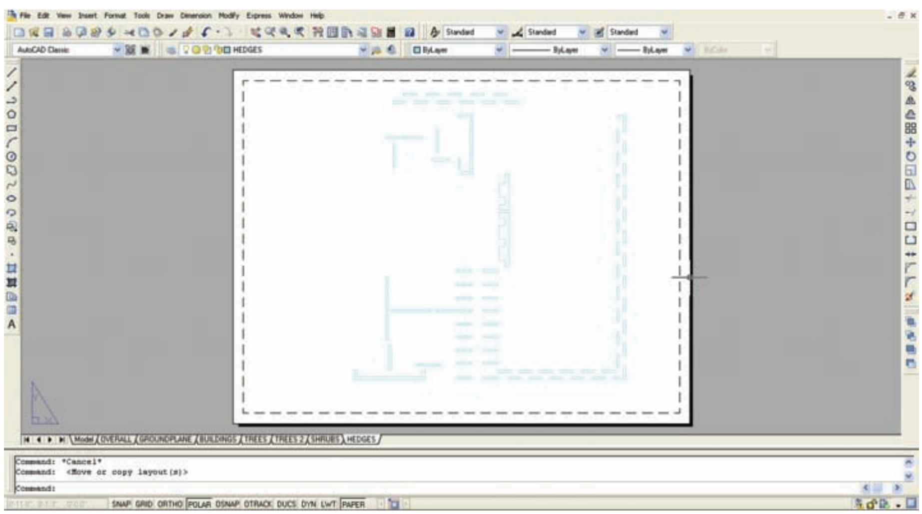


Figure 17.7. Separating small, closed objects can save lots of time when rendering. The advantages of isolating this kind of linework can be seen on pages 164–184.

7. To simplest way to create the PDFs from the Paper Space tabs is to print the tabs using a PDF printer. Each Paper Space tab should be printed individually. In this example, there will be seven separate PDFs. Lineweights and other attributes can be set while printing from AutoCAD.

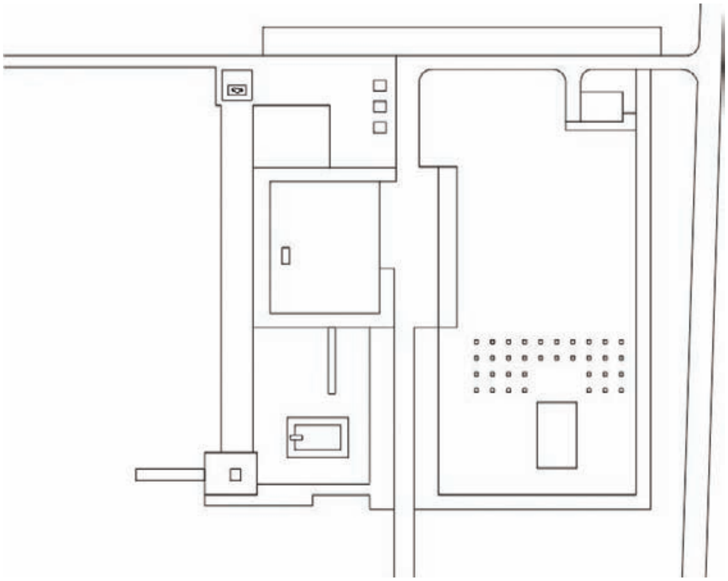


Figure 17.8. One of the seven PDFs printed. Each of the PDFs will be brought into Photoshop.

Linework printed from a CAD application to PDF is stored as vector data and requires the PDF to be rasterized when it is brought into Photoshop. *Rasterization* is the conversion of vector data into raster data; it requires that a pixel resolution be specified for the rasterized PDF file. The following example shows a technique to assemble all of the PDFs into a single Photoshop file:

1. Photoshop allows PDF files to be opened using **File > Open**. When the PDF file to be opened is selected, the Import PDF dialog box will appear. This dialog box has several options that are needed to import the PDF file successfully. The Name option sets the filename for the PDF file upon import.
2. The Crop To drop-down box has several choices. To maintain the proper scale and paper size of your drawing as it was configured in AutoCAD, choose Media Box. For example, if the Bounding Box option is chosen, any extraneous whitespace around the objects will

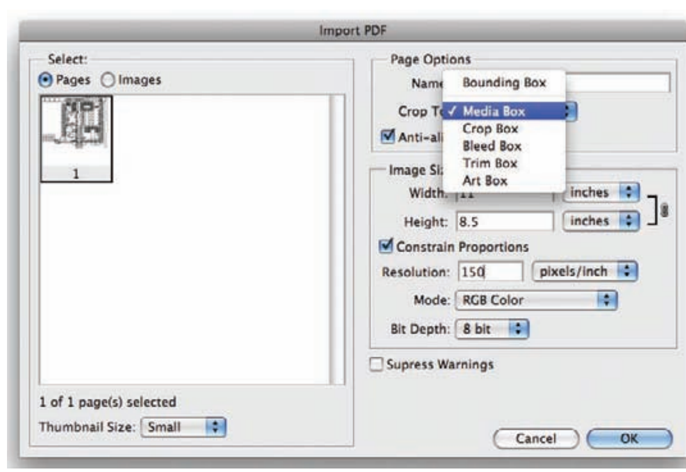


Figure 17.9. When importing the PDF, select **Crop To > Media Box**. This will retain the paper size and scale of the drawing as it was determined in AutoCAD.

be discarded. This will alter the page size and make registering several PDFs on top of one another difficult.

3. Make sure Anti-Aliased is selected. *Anti-aliasing* will smooth the edges of the line-work upon import. If Media Box is selected, the Image Size dimensions should match the sheet size that was set up in AutoCAD. If the page size is changed here, the scale of the drawing will change.

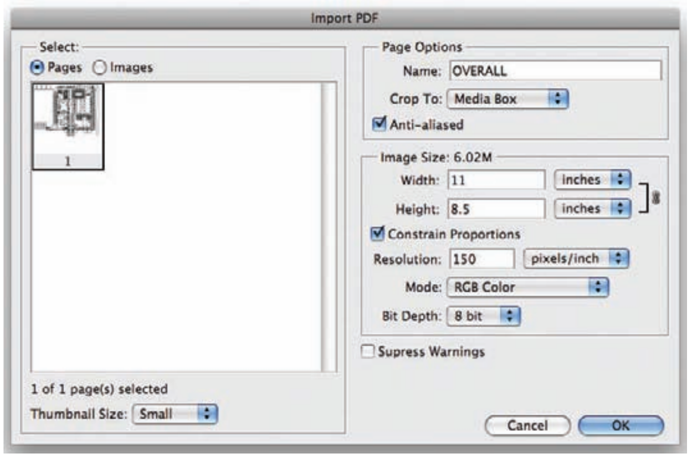


Figure 17.10. Once the Crop To selection is set to Media Box, the Image Size should reflect the image size as it was set up in AutoCAD. In this example, the image size is the same as it was in AutoCAD, 8.5″ × 11″.

4. The Resolution should be adjusted, based on the size of the layout. It is typically set at 150 pixels per inch (ppi), unless there are extenuating circumstances such as a very large file size. (See pages 24–26 for more information on ppi.)
5. Once the settings have been entered into the Import PDF dialog box, click OK. The PDF will open in a new file. The PDF linework will be contained on a single layer. There are many ways to import the PDFs into a Photoshop file, but in this technique it is usually best to open the PDF with all of the linework on it first. In this example, the PDF is named Overall, as in the overall linework for the project. This linework will not typically be used in the final drawing, but it is useful when importing the other PDFs into the drawing as a method for checking the correct placement of all the layers. If a PDF is slightly off when it is imported, it will show up compared to the "overall" linework.
6. This Overall drawing will be the master file into which all of the other PDFs will be imported. When the file is first created, the background of the Photoshop file is transparent. The checkerboard boxes indicate a transparent background.
7. To provide a solid white background for the linework, go to **Layer > New Fill Layer > Solid Color** and choose White.

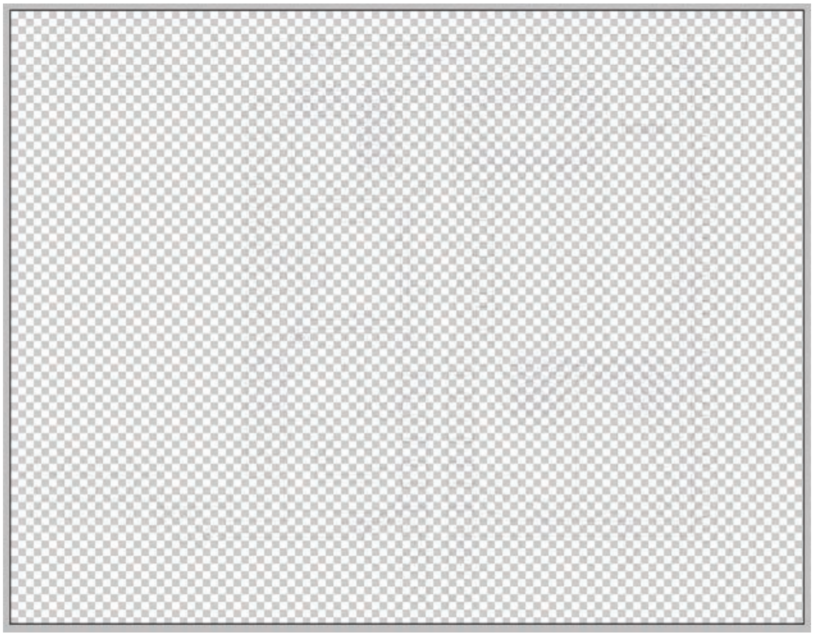


Figure 17.11. When the drawing is first created, the PDF linework will exist on a layer and the background will be transparent.

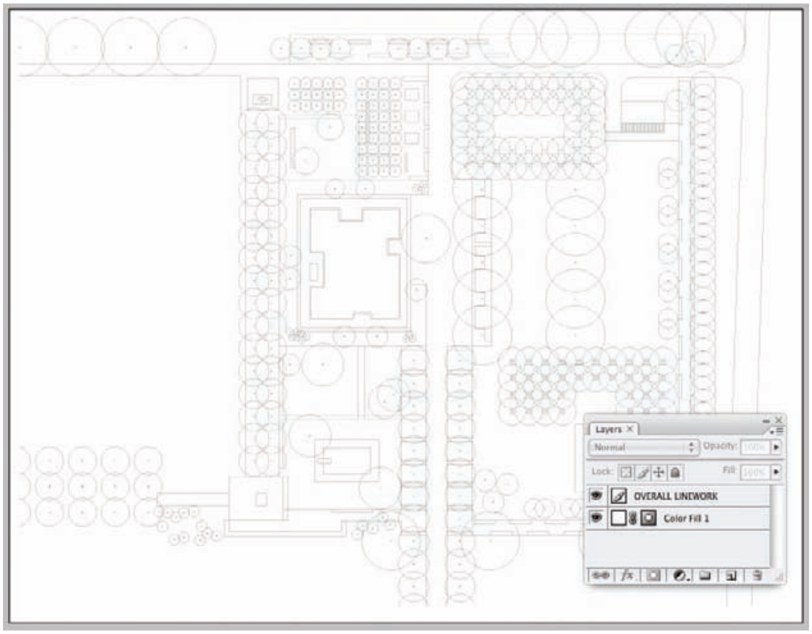


Figure 17.12. Create a fill layer to provide a white background for the linework. Remember to move the fill layer below the linework layer.

After importing the linework as PDF files, each PDF file needs to be merged into a single PSD to create the basis for your illustration. The end result will be a multilayered Photoshop file, with each PDF on its own layer. Because all of the PDF files were printed from AutoCAD using the same Paper Space layout settings, the layers can be duplicated into your new PSD file. These layers will line up directly on top of each other, provided the same settings are used to open each PDF. The PDFs will not be imported into the master Photoshop file. Rather, each PDF will be opened individually as a new file. The linework will then be copied into the master file. To create this multilayered document, consider the following example:

1. Select the PDF file first opened—in this example, the Overall drawing—and save it as a PSD file. As indicated previously, this will become the master file. Keep this file open throughout the entire process.
2. Open a second PDF as a new file in Photoshop by choosing **File > Open**. In this example, the Groundplane PDF will be used. In the PDF Import dialog box, choose the same settings that were used for the first file. There is no need to add a Solid Color fill layer to this file, because the linework will be copied into the master file.
3. With the Groundplane file open, right-click on the linework layer in the Layers palette. Select Duplicate Layer to bring up the Duplicate Layer dialog box.

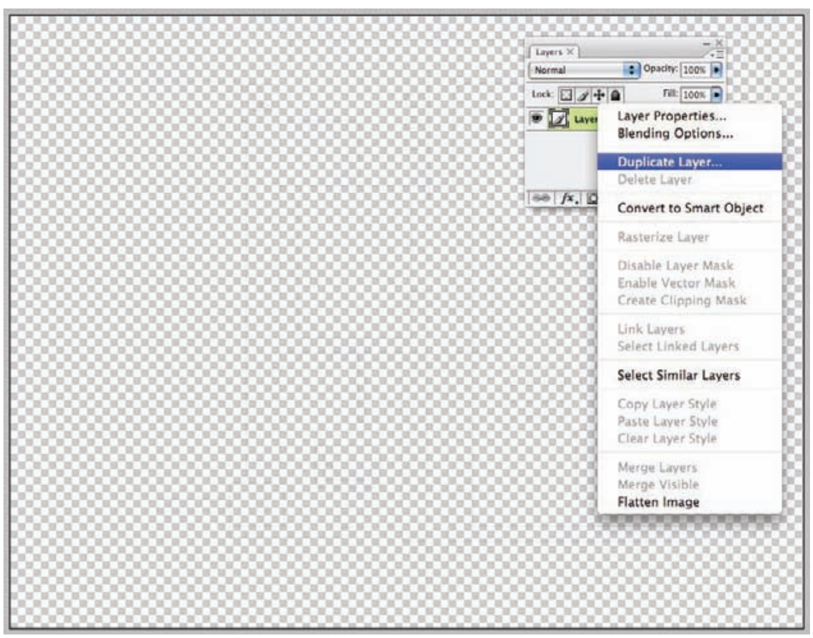


Figure 17.13. With the new PDF file open, right-click on the layer and select Duplicate Layer.

4. The Duplicate Layer dialog box has two options. The As: value determines the name of the duplicated layer. In this example, the name will be **Groundplane Linework**. The second option is to select the destination of the duplicated layer. The layer can be duplicated within the current file, to a completely new file, or to another file that is open in Photoshop. In this instance, the file will be duplicated to the master file, called Overall. Click on the drop-down box to select the file called Overall. Remember, the Overall file must be open in Photoshop to appear in this list.

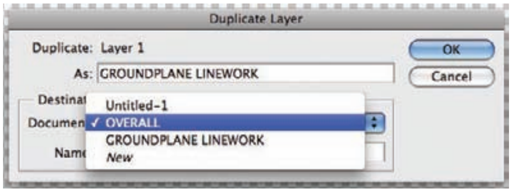


Figure 17.14. Under the Destination, choose the master file, which is called Overall in this example. The linework on this layer will be copied to that file.

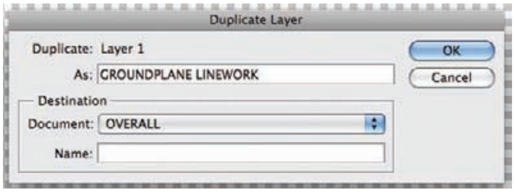


Figure 17.15. This is what the dialog looks like after all values have been entered.

5. Once the linework has been duplicated into the master file, the recently opened PDF—in this case, the Groundplane file—can be closed. It does not need to be saved.
6. The master file will now contain an additional layer with the linework from the new PDF.

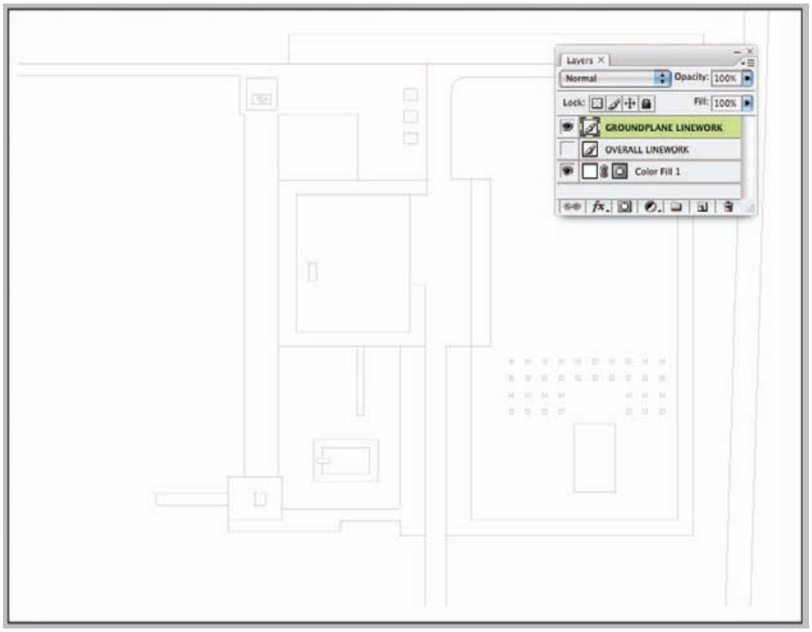


Figure 17.16. The linework shows up as a new layer in the master file.

7. Repeat steps 1 through 6 for each of the PDF files in order to create your rendering base file. The final file will have a layer for each PDF that was exported from AutoCAD.

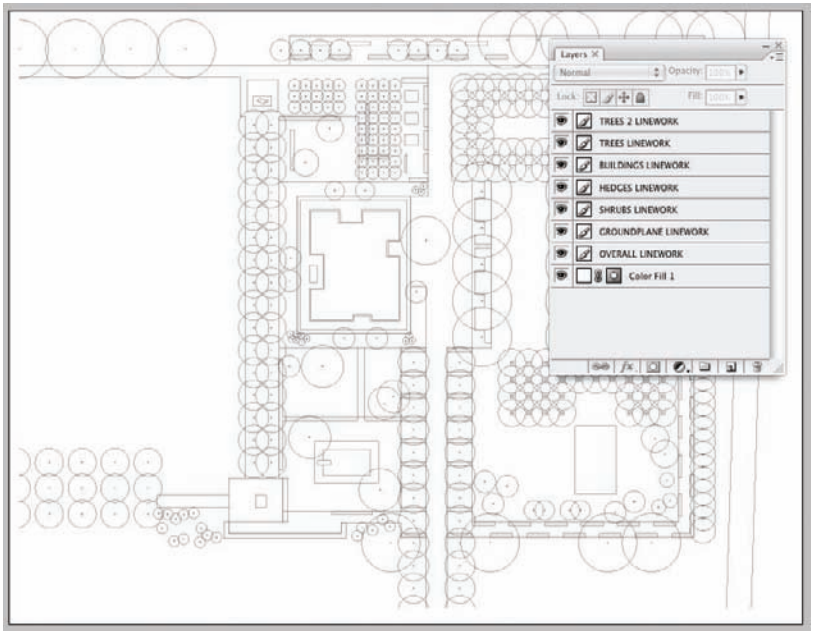


Figure 17.17. Repeat the procedure for each PDF that was exported from AutoCAD. The final Photoshop file will have a layer for each PDF.

Adjusting the Appearance of Linework

While most of the decisions about the appearance of the linework, such as the lineweight, should be made in AutoCAD during the PDF printing process, there are ways to adjust the appearance of linework once it is in Photoshop. Adjustment layers (see page 173) should almost always be used when editing any aspect of a Photoshop drawing, if possible. This way, the drawing can be reverted to its original state if needed. However, using adjustment layers in this case is not a high priority. If the linework is altered and the results are not desirable, and there is no way to go back in the History palette to Undo the adjustment, simply reimport the linework from the original PDF. This is one of the most powerful aspects of this technique. Furthermore, if the design changes, simply reprint a PDF from the AutoCAD file and duplicate that layer into the Photoshop drawing.

Several different techniques can be used to adjust the appearance of the linework. The following example explores some of these techniques:

1. To increase the weight of the linework, copy the layer by dragging it to the New Layer icon in the Layers palette. In this example, click and drag the Groundplane layer and release it over the New Layers icon. A new Groundplane layer will be created. This will increase the density of the linework on that layer.

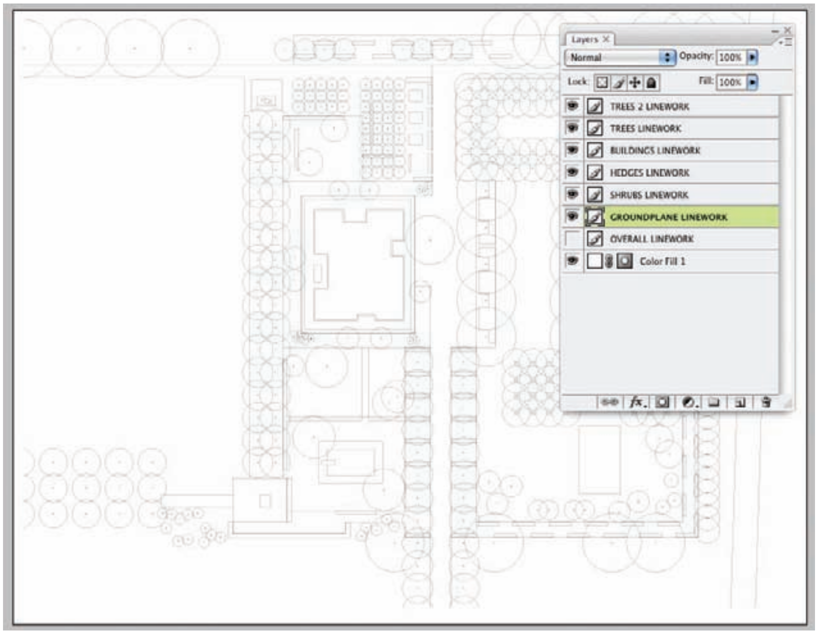


Figure 17.18. The original linework has the lineweight characteristics that were determined in AutoCAD.

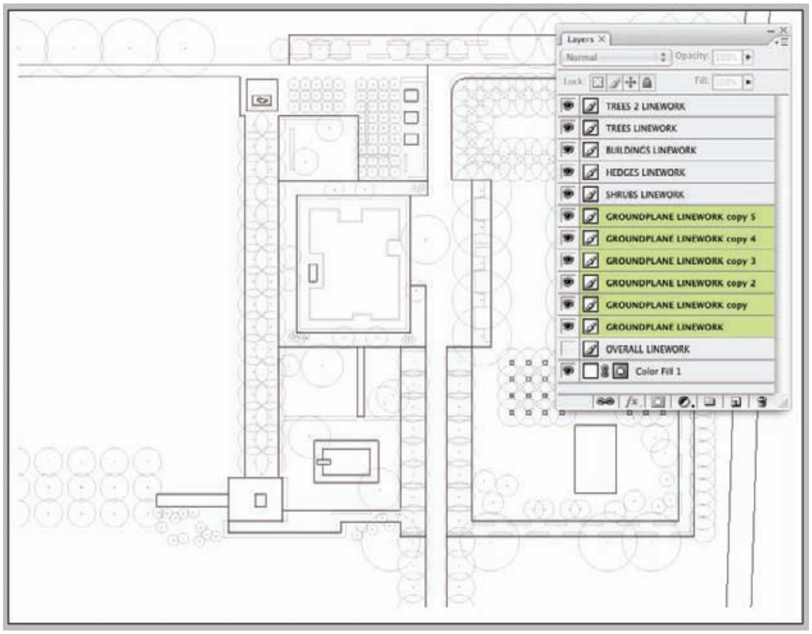


Figure 17.19. To increase the weight of the lines from within Photoshop, make a copy of the linework layer by dragging the layer into the New Layers icon at the bottom of the Layers palette. In this example, the Groundplane layer was copied several times.

2. After multiple layers are created, the layers can be merged into a single layer by selecting them all and choosing **Layer > Merge Layers** from the menu.
3. The linework can be made to appear lighter by either lowering the opacity of the layer or increasing the brightness of the linework using the Hue/Saturation dialog box.
4. The Trees and Trees 2 layers have their Opacity set to 42 percent to lighten the appearance of the linework.

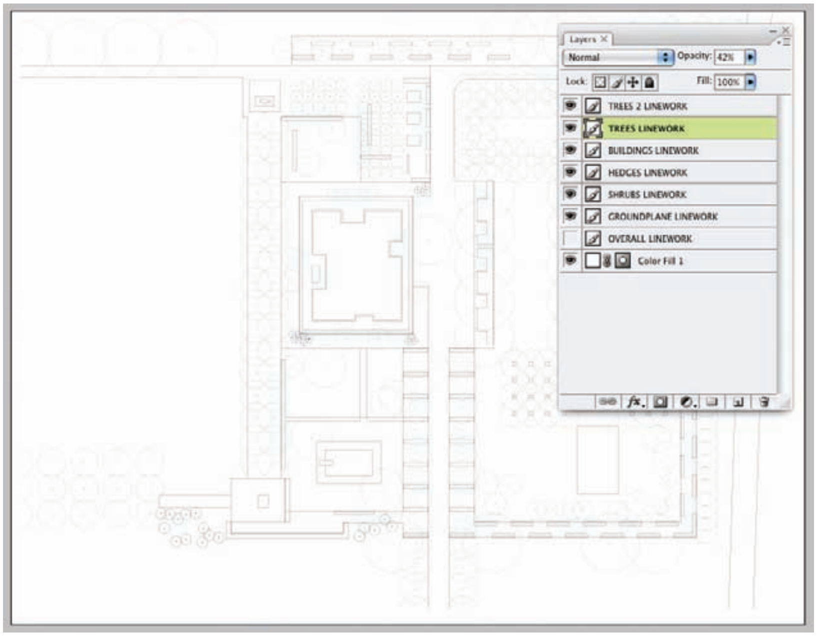


Figure 17.20. By decreasing the Opacity of the layer, the linework becomes lighter. In this example, the two Tree layers have a reduced Opacity.

5. With the Opacity reset to 100 percent, select the Trees and Trees 2 layers and then **select Image> Adjustments> Hue/Saturation**. The Brightness of the linework is set to +49. This lightens the linework.

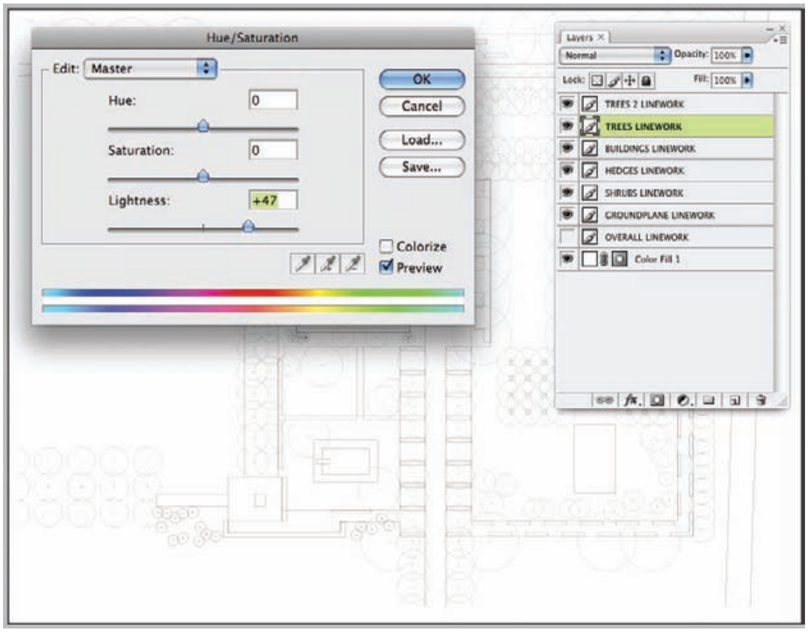


Figure 17.21. Another way to lighten linework is to adjust the Brightness using the Hue/Saturation dialog box.

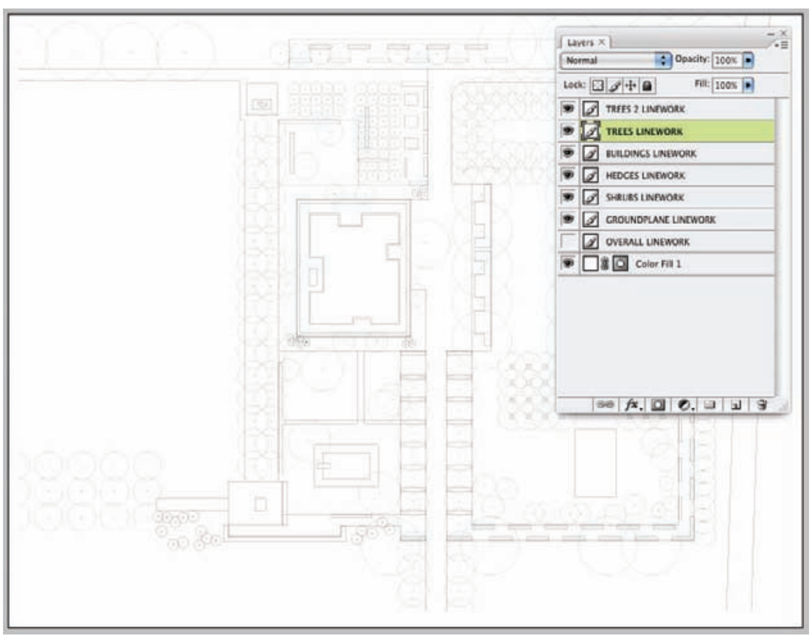


Figure 17.22. The trees in this figure were lightened using the Brightness adjustment.

Chapter 18
Applying Color to a Plan Rendering

One of the first tasks in rendering a plan is to apply a base color to all of the areas. Textures, shading, and other effects can be added later in the process. Two common techniques are used to apply color to a rendering. The most common is to use the Paint Bucket tool to simply paint areas with color. The second method uses Solid Color adjustment layers to color the plan. The techniques are similar; however, using adjustment layers adds flexibility to the drawing. Using this technique, the colors of the plan can be easily adjusted as the drawing develops. This allows all of the colors to be applied quickly, and detailed decisions about which colors to use can be made at the end of the process once all of the colors are on the rendering.

Technique 1: Applying Color with the Paint Bucket Tool

In this technique, the Paint Bucket tool is used to apply color to the rendering. The Paint Bucket tool is similar to the Magic Wand tool (see page 62), except the Magic Wand tool makes a selection *and* fills the selection with a color and the Paint Bucket tool fills the canvas until it reaches adjacent pixels. Many of the Paint Bucket tool's options are similar to the Magic Wand tool's, the most critical being the Sample All Layers option and the Contiguous option. It is important to understand how these options affect the two tools. To understand how the Paint Bucket tool is used to apply color to a rendering, consider the following example:

1. Isolate a single linework layer by hiding all of the other layers. In this example, the Groundplane layer is the first isolated layer.
2. Create a new layer for the base color. It is important to apply the base color on a different layer than the linework. An explanation of how this affects the quality of the image is presented later in this section. Place the base color layer underneath the linework layer in the layer stack.

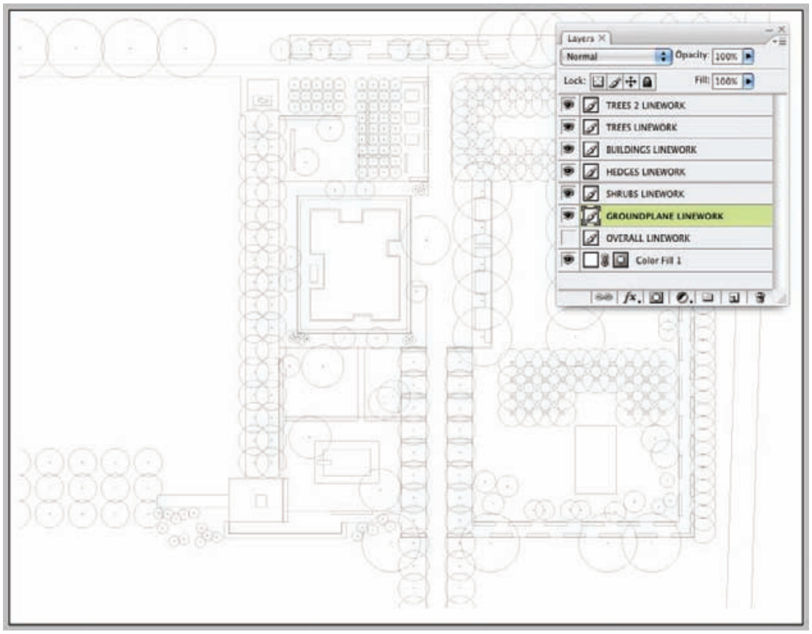


Figure 18.1. All of the layers in this drawing were imported from the PDFs created in AutoCAD. All the layers are visible, with the exception of the Overall layer, which is primarily used to double-check the alignment of PDF layers as they are imported.

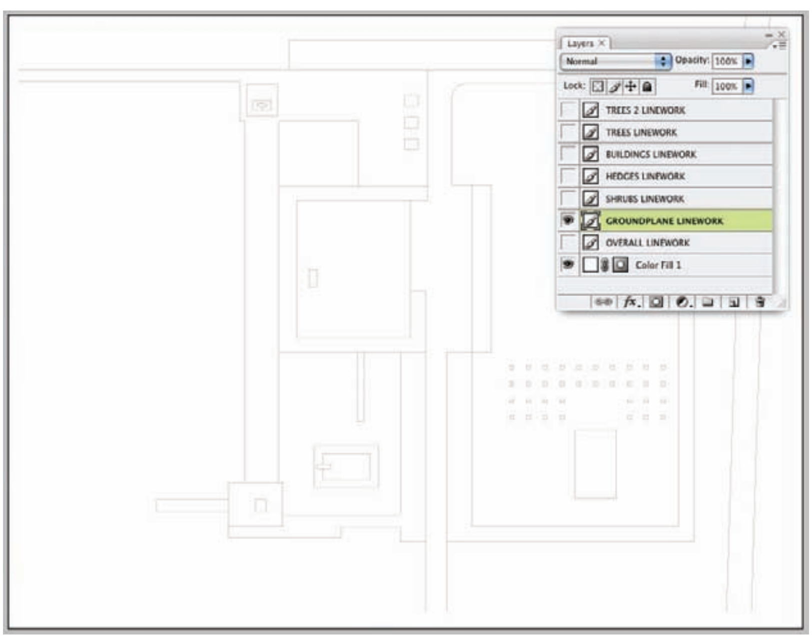


Figure 18.2. To begin applying base color to the rendering, isolate a layer by hiding all of the other linework layers.

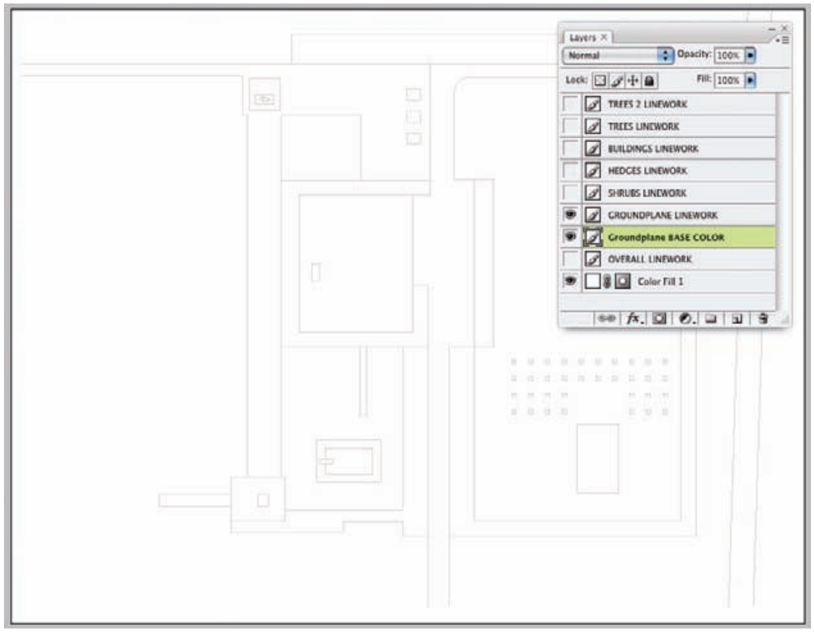


Figure 18.3. Create a new layer by clicking the New Layer icon at the bottom of the Layers palette. Place the base color layer underneath the linework layer in the layer stack.

3. Choose the Paint Bucket tool from the Tools palette. Because the base color will be applied to a different layer than the linework, it is important to have Sample All Layers selected as an option. This will use all visible layers for the boundary definition, but will put the painted pixels on the current layer: the base color layer. The linework will form the boundaries for the Paint Bucket tool. The Contiguous option needs to be selected to allow the Paint Bucket tool to perform this technique.

Figure 18.4. The Sample All Layers and Contiguous options need to be selected for the Paint Bucket tool.

4. To apply color to an area of the drawing, choose a color from the Color Picker by clicking the Foreground icon. Use the Paint Bucket tool to click an area of the drawing.
5. For the Paint Bucket tool to color a specific area of the drawing, the linework that contains it must be closed. Any small gap will allow the paint to “escape” the area. In a perfect world, the linework that comes into Photoshop from AutoCAD would have completely closed lines. This is rarely the case. For example, in this drawing, several areas in the linework are not closed.

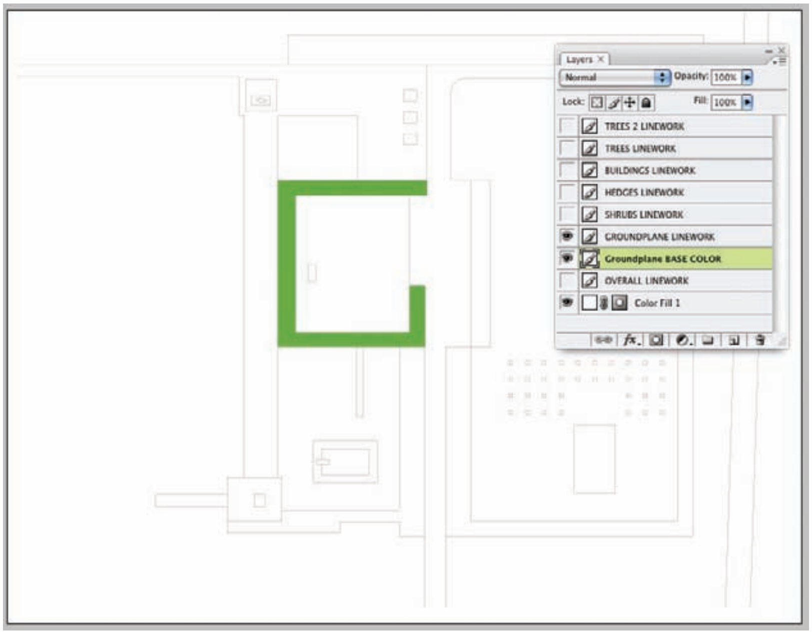


Figure 18.5. Using the Paint Bucket tool, click on an area of the drawing. Make sure the new layer created for the base color is selected. The color will be applied to this base color layer.

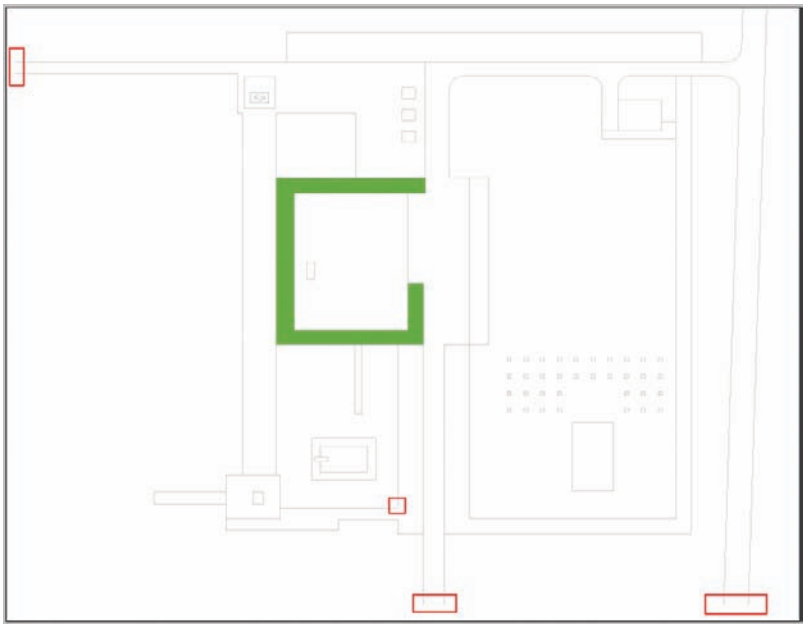


Figure 18.6. Several areas on the drawing do not have closed linework. The areas highlighted in red are open, and the Paint Bucket tool will not color these areas correctly.

6. There are two ways to close open lines. The easiest way is to use the Paint Brush tool with a small hard-edged brush and paint in the missing linework. The new lines will be painted on the linework layer, not the base color layer. However, it is sometimes difficult to get the new linework to have the same appearance as the existing linework.
7. Another technique is to create a TEMP layer that will be deleted later. Draw the lines on this layer and once the paint has filled the area, the TEMP layer can be deleted. To use this technique, start by creating a new layer named TEMP. On this layer, paint a black line to close the linework.

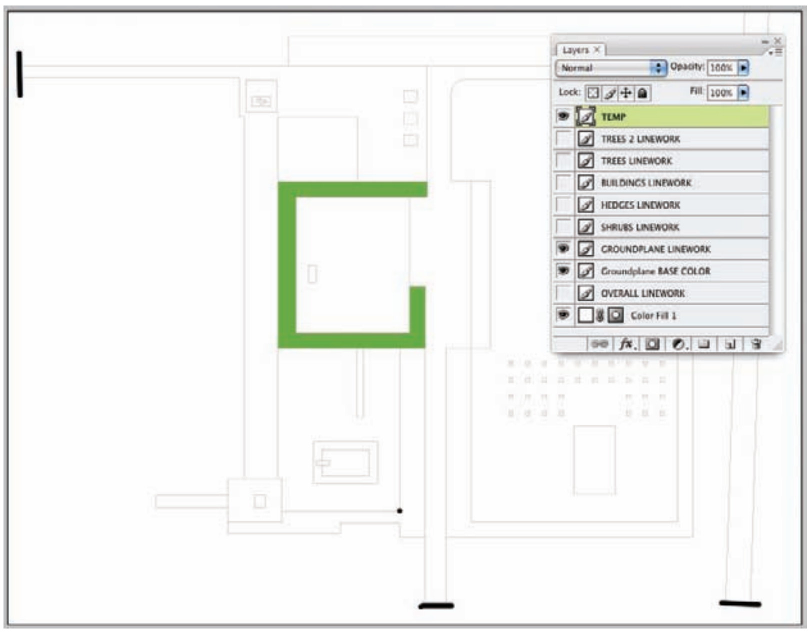


Figure 18.7. Create a new layer named TEMP. Using the Paint Brush tool, close the linework with a black line. The black lines will be removed when the TEMP layer is deleted, so they do not need to be precise.

8. Using the Paint Bucket tool, paint the recently closed areas with a color.
9. When the TEMP layer is deleted, the black lines that were used to close the lines disappear.

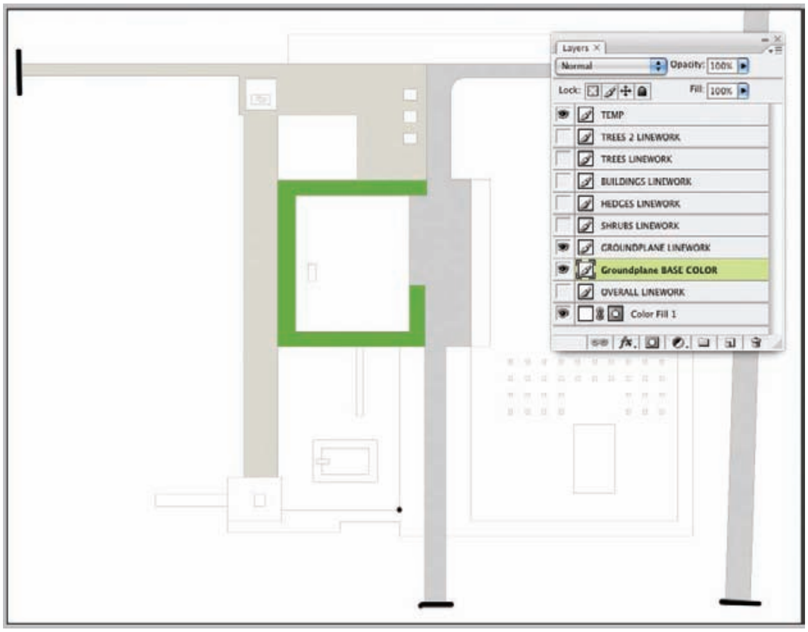


Figure 18.8. Now that the TEMP layer has been used to close the linework, the areas can be painted with the Paint Bucket tool.

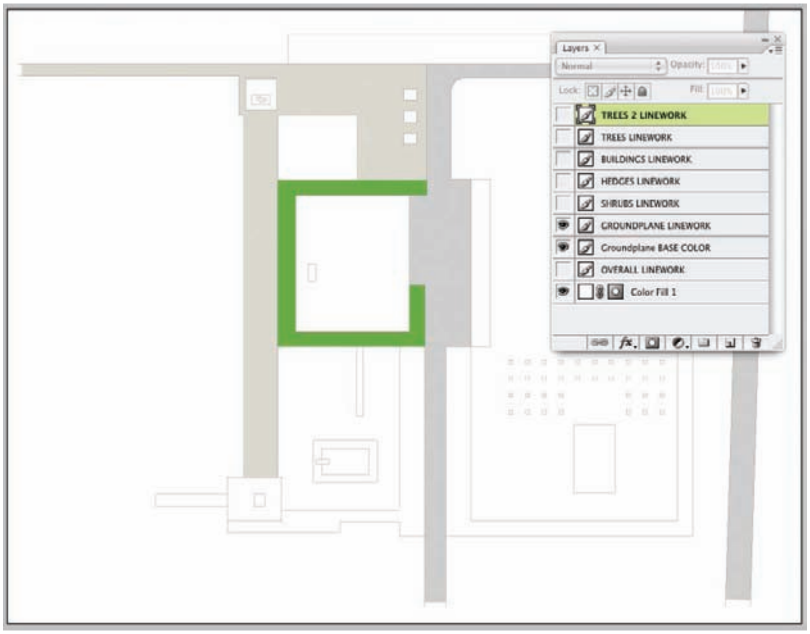


Figure 18.9. Once the areas have been painted, the TEMP layer can be deleted. This leaves the original linework intact.

The process of filling areas of the rendering continues until the entire base color scheme has been applied. Typically, the fills will start at the lowest level and work their way up toward the viewer. It is important that each of the base color areas is created on a separate layer and is labeled as a "base color" layer. There are a couple of advantages to keeping the base color separate from the linework. The most important is that the quality of the linework will not be degraded if the base color is on a layer beneath the linework. If the Paint Bucket tool is used directly on the linework layer, the color of the fill will bleed into the edges of the lines. The following figures show the difference between placing the base color on the same layer as the linework and placing it on a separate layer below the linework.

Figure 18.10. When the linework is imported from AutoCAD, it is rasterized. This means that the linework is converted to a set of pixels. To replicate the smooth edges of the linework, Photoshop adds some gray pixels along the edges of the lines. From a distance, this makes the lines appear smooth. Without these gray edges, the linework would appear jagged or harsh.

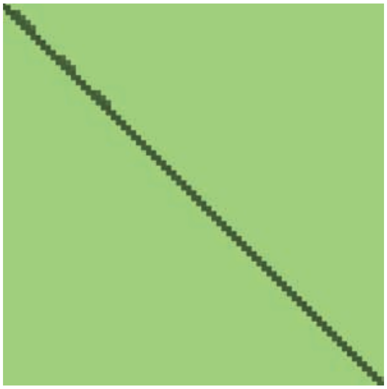


Figure 18.11. When the Paint Bucket tool is used on the same layer as the linework, the pixels from the Paint Bucket tool bleed into the edges of the linework. This causes the smooth transition of the line created in the rasterization process to be degraded. On very thin linework, the lines may even appear spotty or almost disappear in places. Adjusting the Tolerance of the Paint Bucket tool can control some of the effect of line degradation, but it is almost always better to keep the linework of a separate layer.

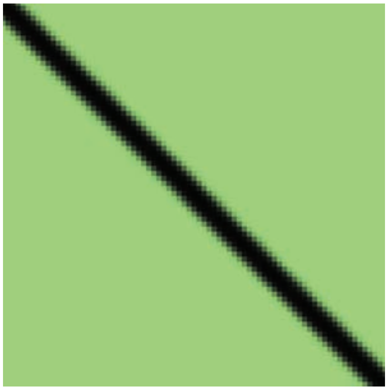


Figure 18.12. When the base color is placed on a separate layer below the linework, the gray edges of the original linework are maintained. This keeps the crisp and smooth linework that was imported from the PDF intact.

The second reason to keep the base color on a separate layer is for selecting colors later in the drawing. One of the disadvantages of using the Paint Bucket technique is that it is more difficult to change the colors of the drawing once they are set. If the Paint Bucket technique is used, it is best to keep each different color on a separate base color layer. This will make it easier to select the colors later. To see how to change the color of a base color area using the Paint Bucket method, consider the following example:

1. The single Groundplane BASE COLOR layer from the previous example has been repainted as two separate layers. The green color is on the Under Shrubs BASE COLOR layer and the gray area is on the Driveway BASE COLOR layer.

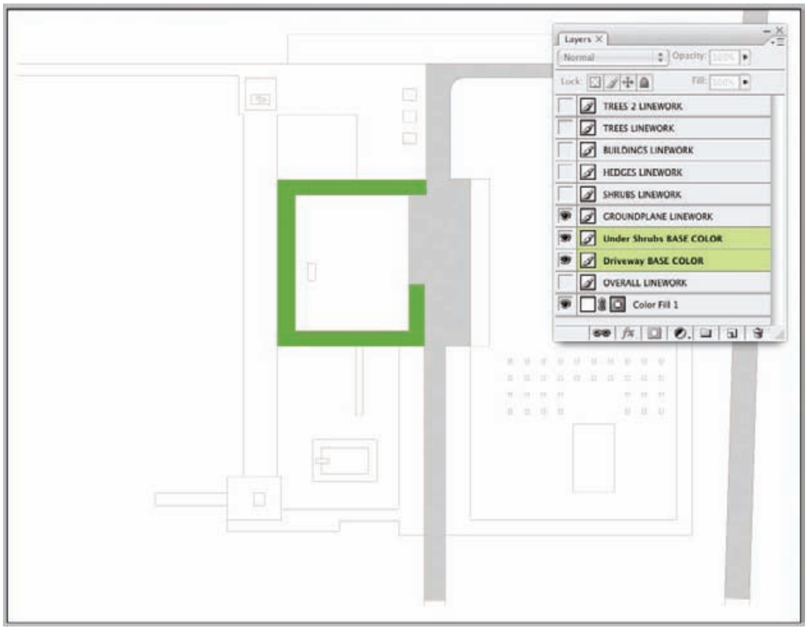


Figure 18.13. For this example, the green and gray areas of the drawing have been repainted onto separate layers.

2. Instead of being repainted, the layers could have been separated by using the Magic Wand tool, selecting each color, and using **Layer > New > Layer Via Cut**. Provided the selection is accurate, this will put the selected color on a new layer. With this method, each color would need to be selected this way and cut to a new layer individually.
3. To change the color of one of the base color layers, begin by selecting all of the pixels on that layer. This can be accomplished by Ctrl+clicking (Windows) or Cmd+clicking (Mac) on the Layer icon in the Layers palette.
4. Once the pixels on that layer are selected, choose a new color using the Color Picker. This new color will be painted into the selection using the Paint Bucket tool. Once the color is selected, click in the selection area with the Paint Bucket tool.
5. The colors can also be changed using the Hue/Saturation adjustments instead of replacing the color with the Paint Bucket tool. Once the pixels are selected, open **Image > Adjustments > Hue/Saturation**, and adjust the color using the Hue/Saturation dialog box.

Hold the Ctrl key (Windows) or the Cmd key (Mac) and click on the icon to select all of the pixels on that layer. It is critical to click directly on the icon, not the name of the layer or the Visibility icon.

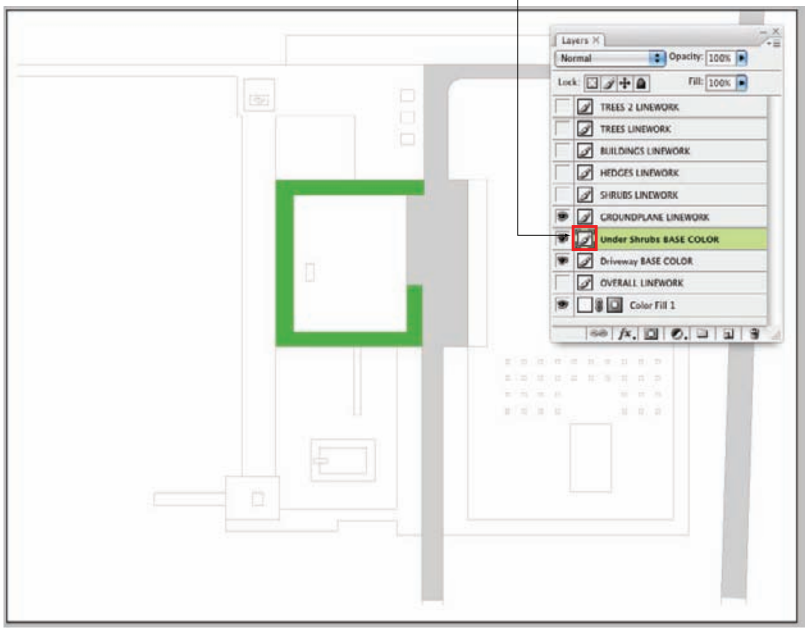


Figure 18.14. Ctrl+clicking (Windows) or Cmd+clicking (Mac) on the Layer icon will select all of the pixels on that layer.

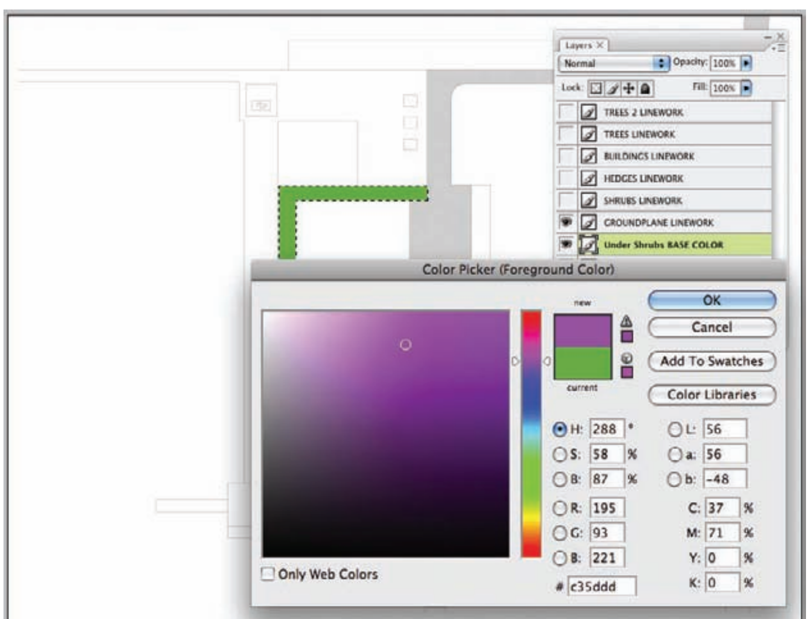


Figure 18.15. Once the area has been selected, choose a new color from the Color Picker.

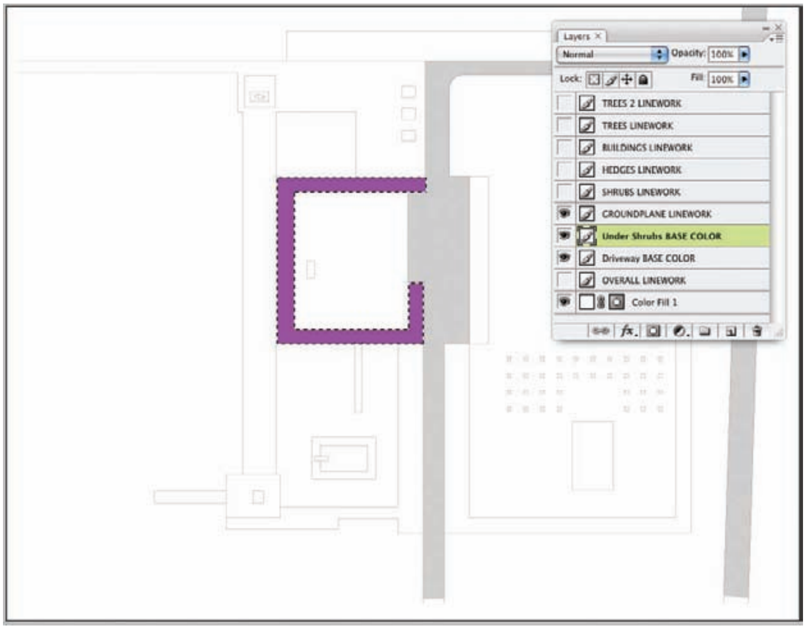


Figure 18.16. Use the Paint Bucket tool to apply the new color in the selected area. The new color will replace the old color.

Technique 2: Applying Color Using Adjustment Layers

A more effective technique is to use adjustment layers to apply the base color. Adjustment layers allow the colors to be changed easily; more importantly, the results of the color changes are displayed interactively on the screen. Changing colors using the Paint Bucket method requires choosing a color, applying it, and then examining the results. With the Adjustment Layer method, as the colors are changed they are instantly reflected in the drawing. This makes selecting colors that work well together much easier.

Using adjustment layers is similar to using the Paint Bucket tool to apply base color. However, instead of using the Paint Bucket tool to directly paint the color to the selected area, the Magic Wand tool is used to select the area first. When a Solid Color adjustment layer is applied, the selection becomes a mask for the adjustment layer. To understand how to apply base color using adjustment layers, consider the following example:

1. As in the earlier example using the Paint Bucket tool, start by isolating one of the linework layers.

2. If a TEMP layer is needed to close areas of the drawing, create that layer and paint the areas needed to close the lines. See the earlier example for details on this step.
3. Using the Magic Wand tool, select all areas of the drawing that will have the same base color applied.

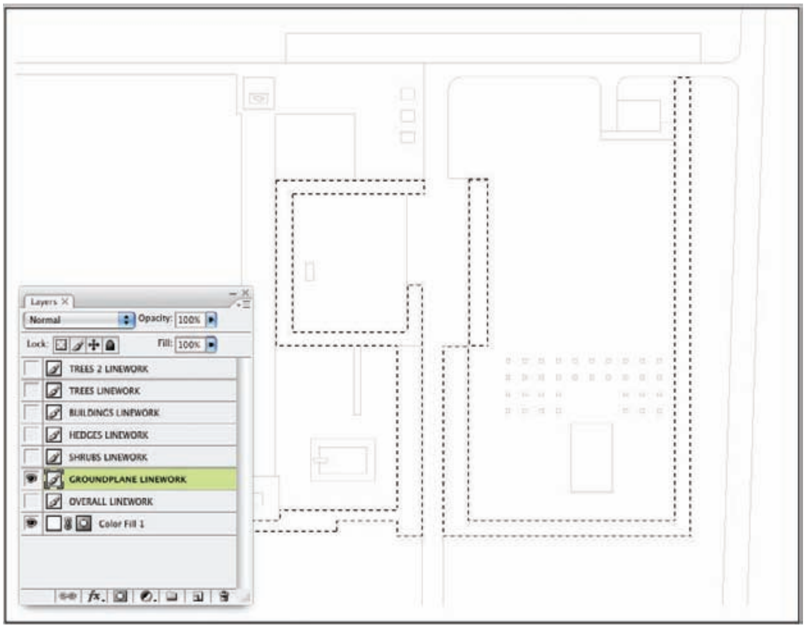


Figure 18.17. Begin the process by isolating one of the linework layers. It is usually more effective to work from the ground plane up. Select all areas of the drawing that will receive the same color. In this example, all of the areas that have groundcover have been selected. To select multiple areas with the Magic Wand tool, hold the Shift key while clicking in multiple areas.

4. From the bottom of the Layers palette, select the New Adjustment Layer icon. It is the half white, half black circle. A new adjustment layer can also be created by selecting **Layer> New Adjustment Layer**.
5. From the Adjustment Layers list, choose Solid Color. The Color Picker will appear. Choose a color for the area from the Color Picker. A new Color Fill layer will be created and added to the layer stack.
6. (The icons in the Layers palette were enlarged to aid this demonstration. To do this, use the Layers Palette menu and select Palette Options.) The Color Fill layer has two items: an icon that represents the color of the fill and an icon that represents the mask. The first icon represents "what" is happening on the layer (i.e., a solid green color is being applied). The second icon represents "where" the green color is being applied (i.e., to the white areas in the mask).

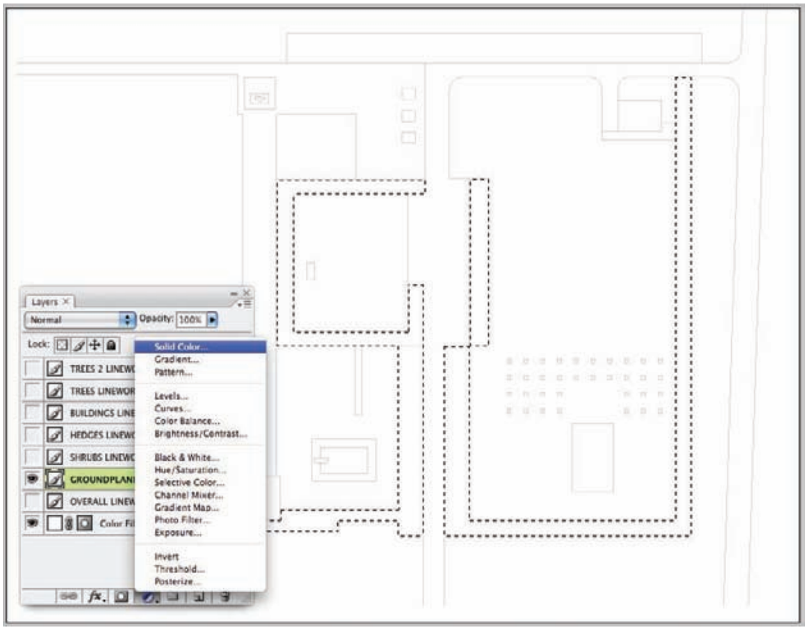


Figure 18.18. Create a new adjustment layer from the icon in the lower portion of the Layers palette. A list will pop up indicating the range of adjustments that can be made to the drawing.

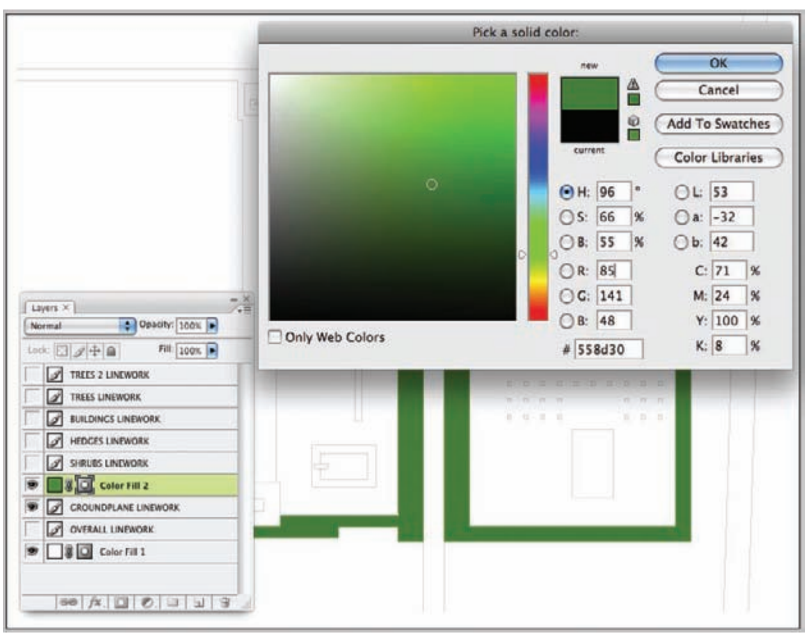


Figure 18.19. Choose a Solid Color adjustment layer from the options. This will apply a solid color to the areas of the drawing that are selected. A new Color Fill layer will appear in the Layers palette.

7. To change the color of the adjustment layer, double-click the green icon. The Color Picker will appear. Adjust the color in the Color Picker and it will be reflected on the drawing.

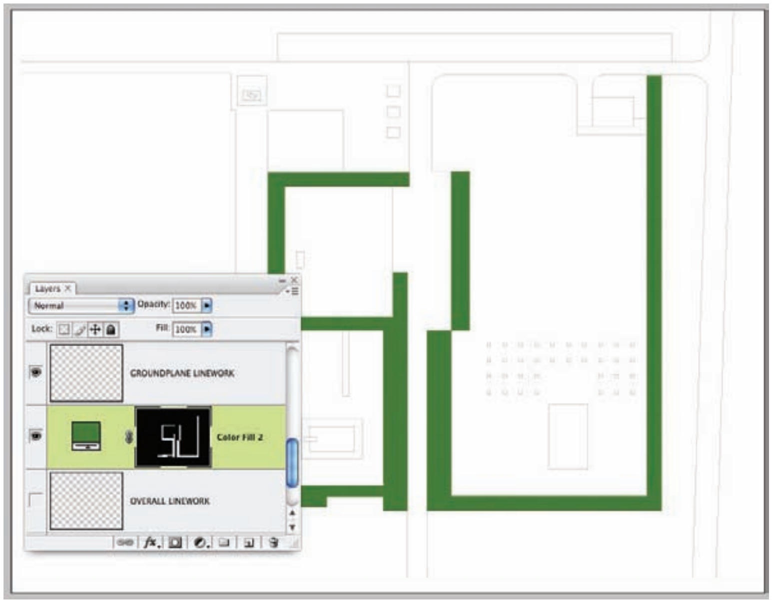


Figure 18.20. The adjustment layer has two icons. The first represents "what" is happening on the layer and the second represents "where" it is happening.

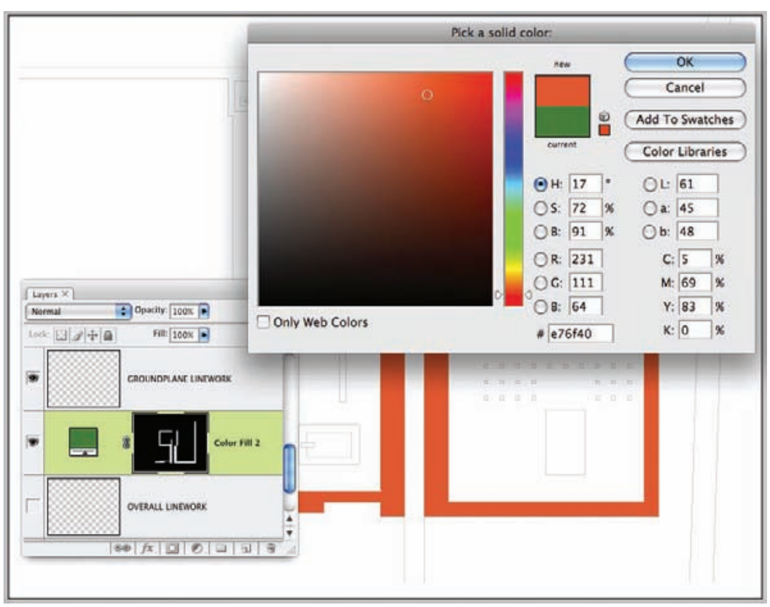


Figure 18.21. Double-click on the "what" icon to change the color of the fill.

If an area needs to be added to the adjustment layer, the mask must be altered. In this example, another area needs to be painted green. Acquiring this skill is critical if this technique is to be used to apply base color. The technique is relatively straightforward; however, attention needs to be paid to the details of this process during the first couple of attempts. The following steps cover the process in detail:

1. Click the Mask icon in the Color Fill layer. The foreground and background colors will change to black and white, or a version of gray, depending on the colors currently chosen. Remember that painting white will take away the mask and painting black will restore the mask. In other words, where white is painted, the green will show. Where black is painted, the green will go away.
2. With the Magic Wand tool, select an area of the drawing to be added to the selection.
3. Using the Paint Bucket tool or the Paint Brush tool, color the selected area white. This will "open" that area of the mask, allowing the green Solid Color adjustment to show through.
4. To remove an area of green from the layer, select an area and paint it black.

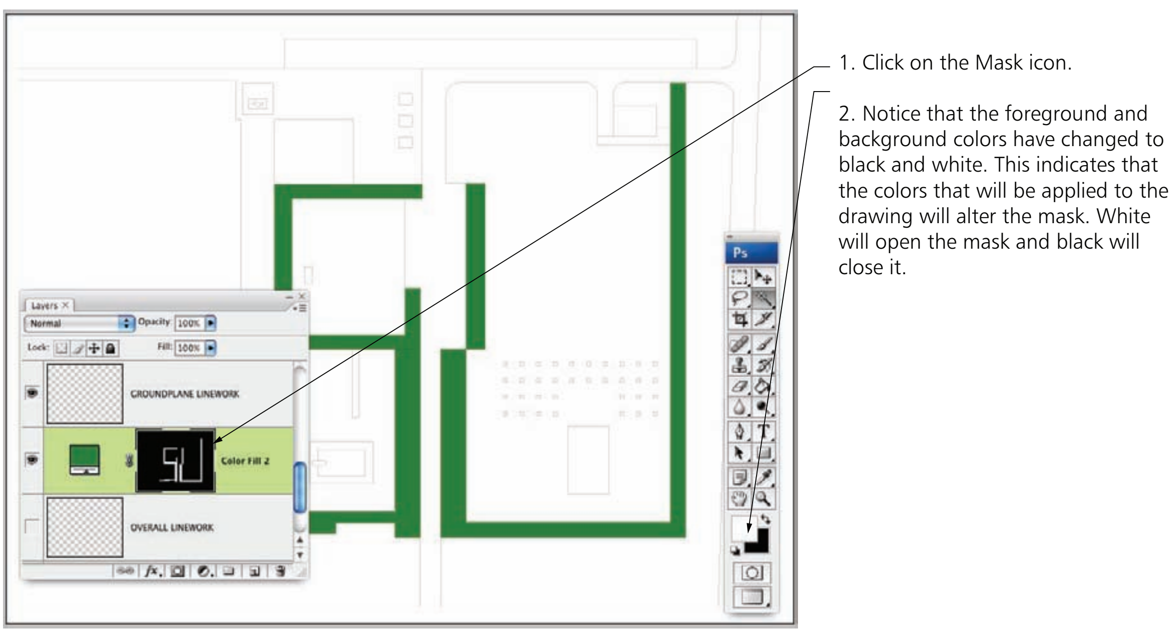


Figure 18.22. Click the Mask icon to alter the mask.

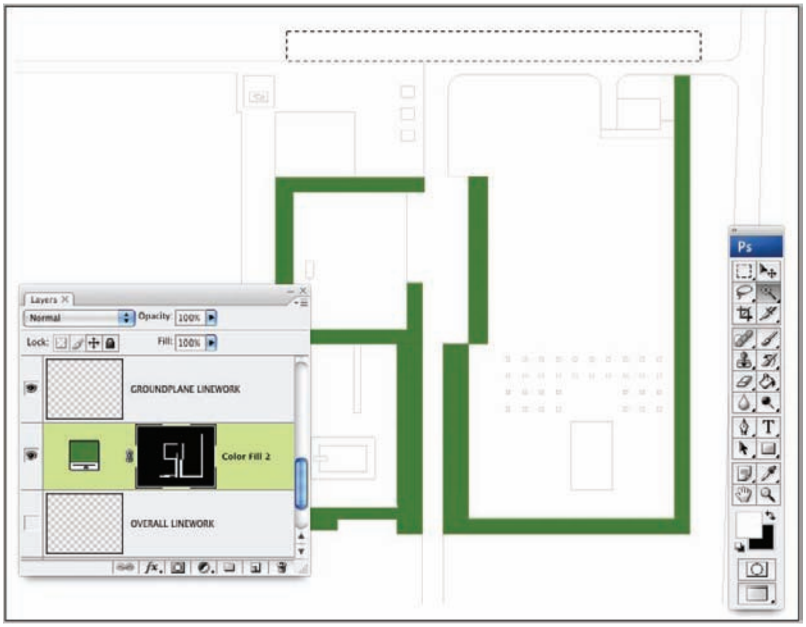


Figure 18.23. Use the Magic Wand to select the area to be "opened" in the mask.

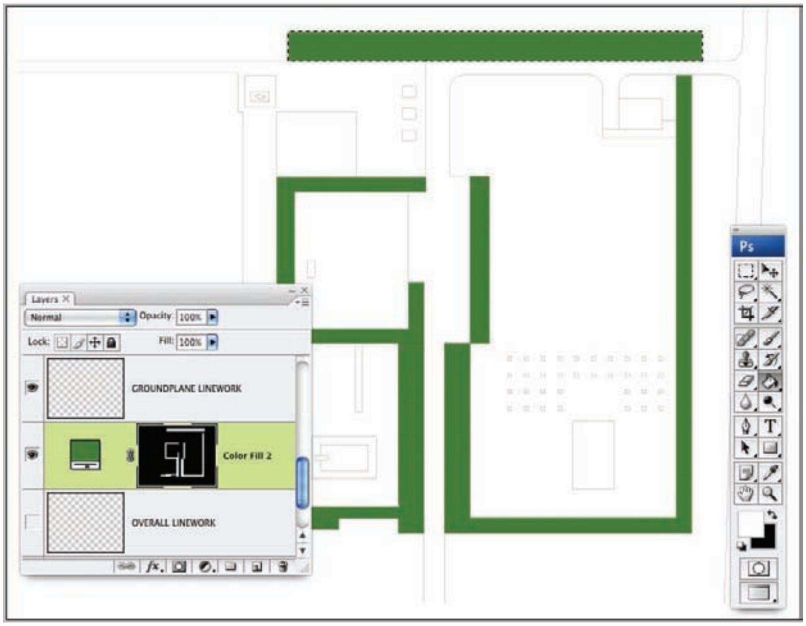


Figure 18.24. Use the Paint Bucket tool to paint the selected area white. This will "open" the mask and allow the green color to show through. The newly painted white area will be visible in the Mask icon on the Layers palette.

To complete the drawing, continue to create all of the base color layers for the ground plane. Each base color will be on its own layer with all of the base colors below the linework. The final colors do not need to be completely determined at this point. The advantage of this technique is that it will be easy to adjust the colors once all of the colors are on the drawing.

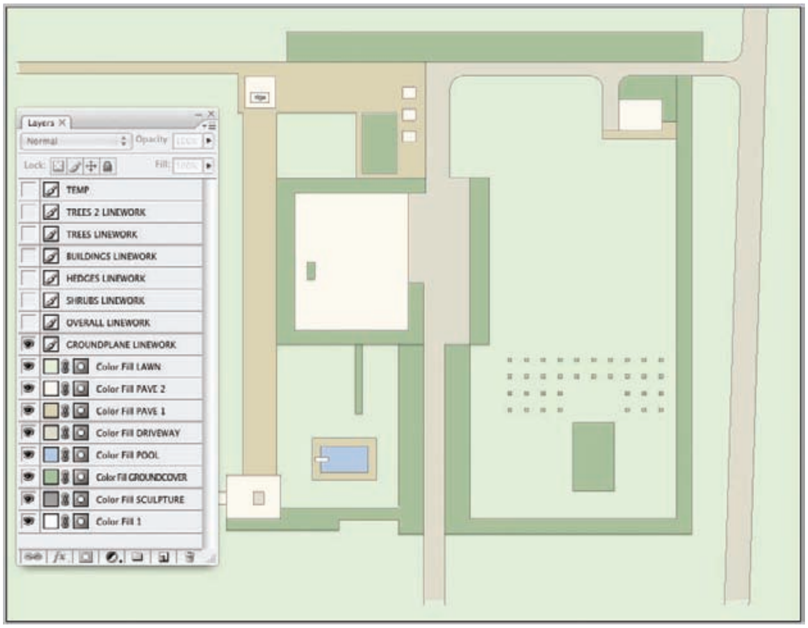


Figure 18.25. Continue to complete the base color for the ground plane. Each base color should be on a separate layer. This will make it easy to change the colors at the end of the drawing.

To complete the base color application, isolate another linework layer from the drawing and apply color to that layer. One of the advantages of separating linework onto different layers is that complex selections can often be made more easily if the linework is isolated from the rest of the drawing. Imaging how many areas would require a Magic Wand selection if all of the linework were on a single layer. Every area on the ground plane that is intersected by the trees above or by other linework in the drawing would have to either be redrawn with a Selection tool, or every area would need to be clicked.

There is another technique that allows closed objects to be selected quickly. Consider the following example:

1. Isolate the Trees linework layer.
2. Using the Magic Wand tool, click in the whitespace outside the Tree linework. Select everything except the inner area of the trees.
3. To Invert the selection, choose **Select > Inverse**. This will select the inner areas of the trees. Add a Solid Color adjustment layer to color the trees.

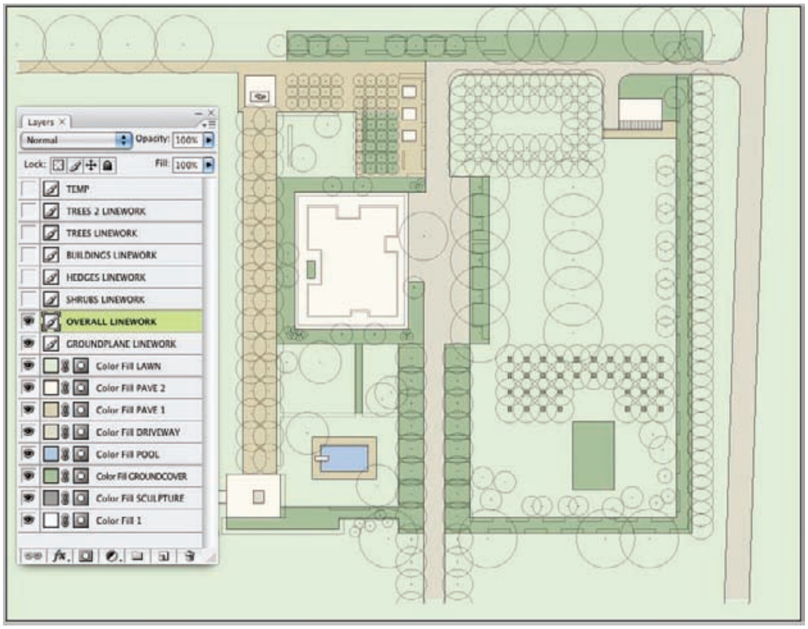


Figure 18.26. The advantages of separating the linework onto different layers become more obvious when all the linework is visible.

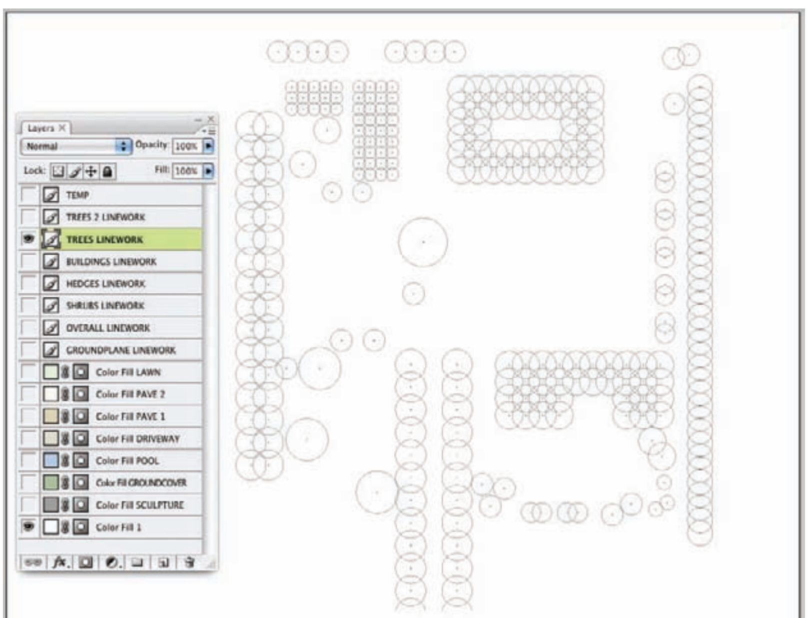


Figure 18.27. To begin another technique for selecting multiple items, isolate the Trees layer by making all other linework invisible.

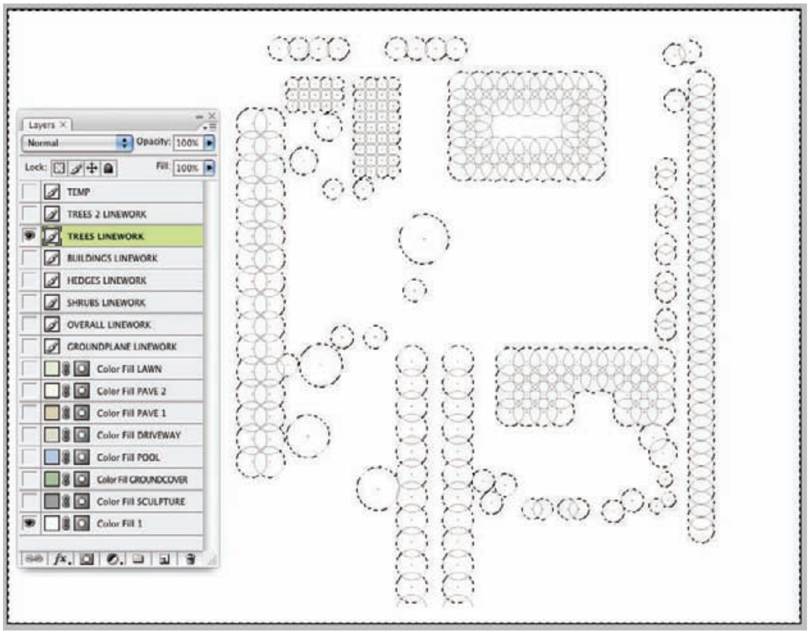


Figure 18.28. Select the whitespace outside of the trees. The "marching ants" selection box runs along the edge of the drawing.

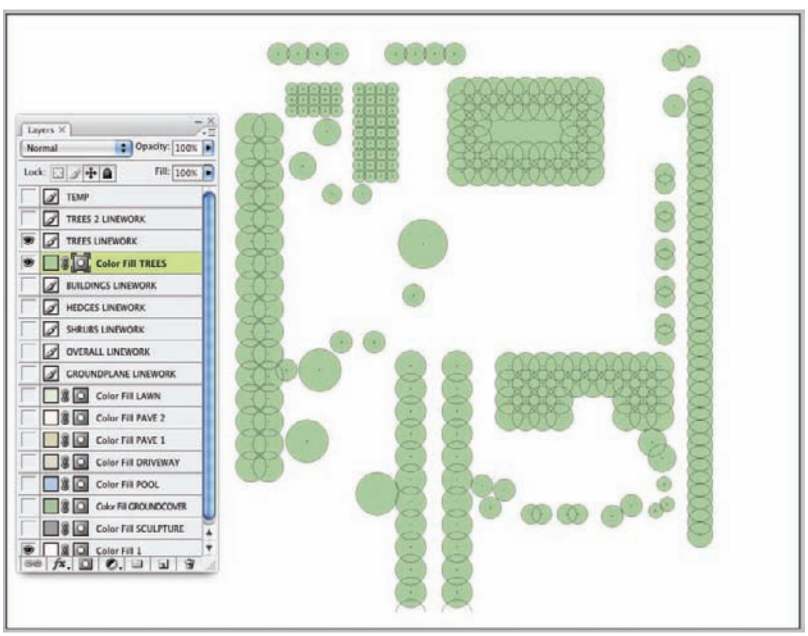


Figure 18.29. Invert the selection using **Select > Inverse**. This will select the inside of the trees. Apply a Solid Color adjustment layer to the selection.

4. The interior area of the grove of trees in the upper-right corner has the interior of the grove filled in. To remove this area from the selection, click the Mask icon in the Color Fill Trees layer. Use the Magic Wand tool to select the interior of the grove. Use the Paint Bucket tool to paint this area black.

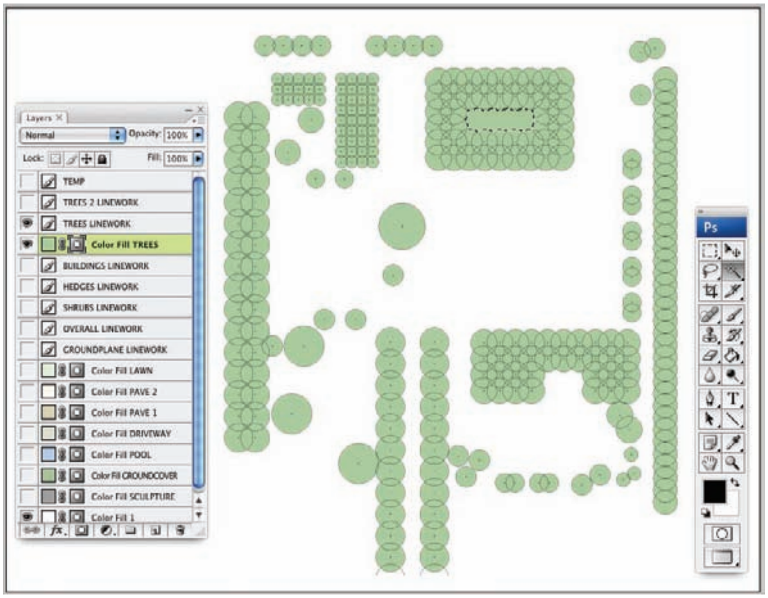


Figure 18.30. With the Magic Wand tool, select the area to remove from the selection.

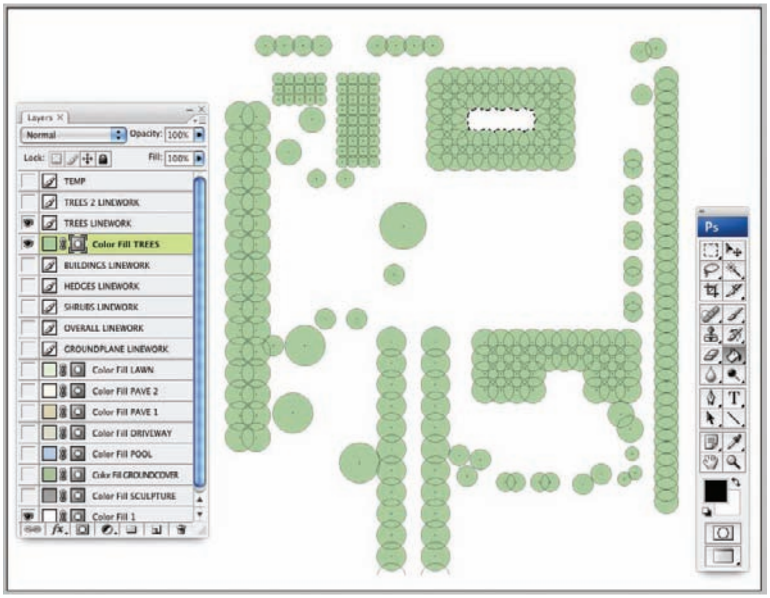


Figure 18.31. To remove the fill from the area, use the Paint Bucket tool to paint it black.

5. The same technique can be used to color the hedges.

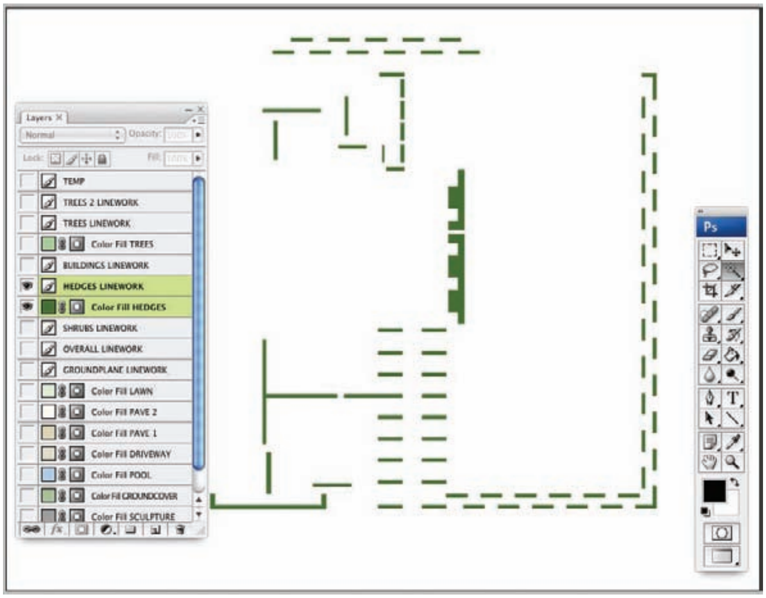


Figure 18.32. The hedges can be colored using the same selection technique.

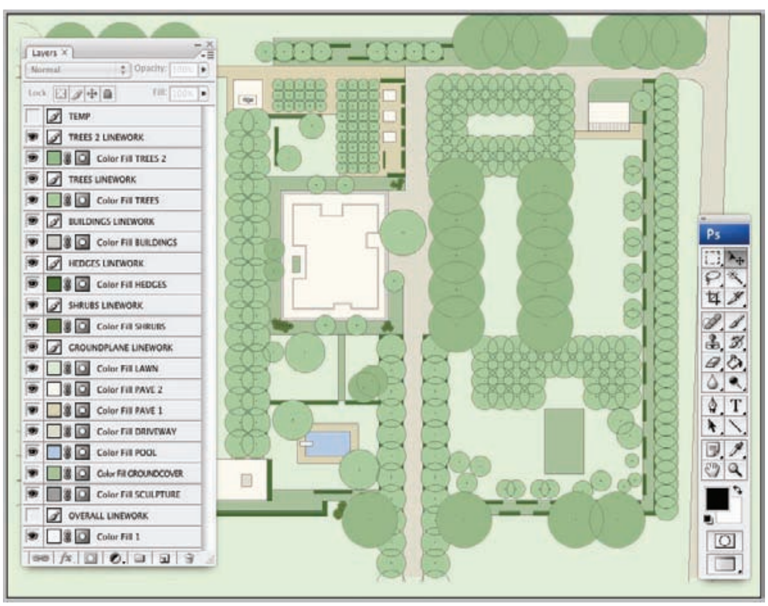


Figure 18.33. Once all of the base colors have been applied, the layer order and layer transparency need to be adjusted to make the drawing legible. At this point, double-clicking a base color adjustment layer can easily change the colors of the drawing.

The process of applying the base color to all areas of the drawing continues until all the linework has at least one base color layer. Once all of the base colors have been applied, the colors need to be adjusted, the layers need to be ordered, and the transparency needs to be adjusted to make the drawing more legible.

To adjust the transparency of the layers, select the base color layer from the layer stack. In this example, the trees are the most obvious elements that need to be more transparent. Typically, the linework layers will not be made transparent. Once the trees layers are made more transparent, the drawing will be ready to add shading, textures, and other elements that will add to the character of the rendering.

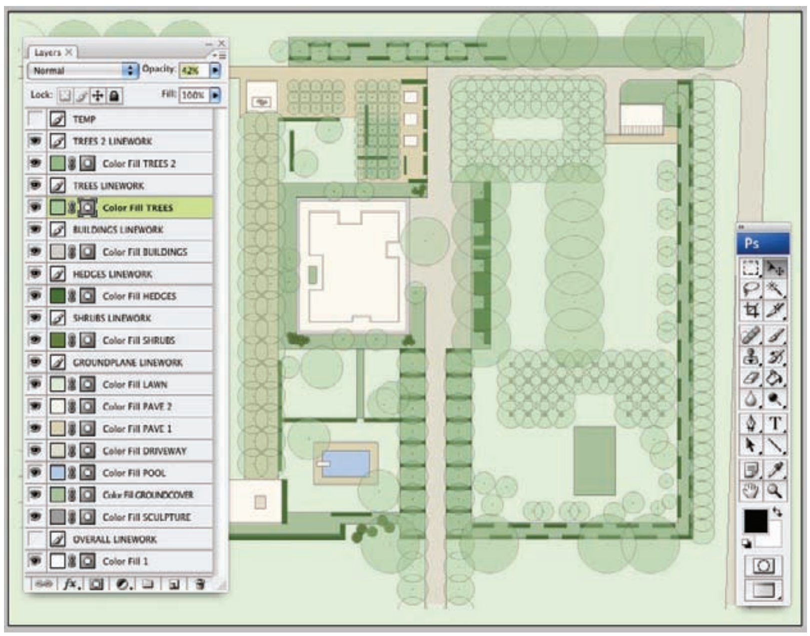


Figure 18.34. The layer order and layer transparency can be adjusted to make the drawing more legible.

Saving Channels

If the base colors are separated onto different layers it is easy to recall the selection at any time. In essence, the layer is also saving the selection. However, it is also possible to save selections using channels. Channels provide more flexibility and more information when necessary. With Channels selections from several different layers can be saved together. A channel can translate a selection into 256 levels represented as grays from white (fully selected) to black (unselected), similar to a mask.This allows complex selections to be saved that can apply effects or procedures in a varied or gradated manner.

1. To save a channel from a selection, using one of your Selection tools (the Lasso, the Marquee), right-click within the selection and choose Save Selection. A dialog

box will appear that will give you several options; the first option lets you designate the drawing in which to save the selection.

2. The selection can be saved to another drawing if necessary, or a channel can be created in the current drawing. Next, you can choose to create a new channel, create a layer mask, or add, subtract, or intersect it with an existing channel. After deciding how to create the mask, click OK and the new channel will be created. If a new channel is created, it will be added to the Channels tab; if a layer mask is created, it will appear on the specified label.

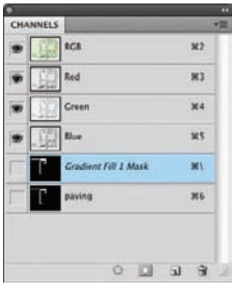


Figure 18.35. The Channel palette.

In a manner similar to the way solid fills were created, the Gradient tool can be used to create gradated fills. The Gradient tool is on the same button as the Paint Bucket tool. In order to apply a gradient, a selection must first be created so the gradient can be applied within it. The default gradient is a linear gradient and uses the foreground and background colors as the basis for the gradient. The Gradient toolbar allows you to select the type of gradient: linear, radial, angle, reflected, and diamond. Each of the gradients can be applied by clicking the center point of the gradient and then dragging to specify the length and direction that the gradient changes along.

Figure 18.36. Gradated black-and-white selection as a channel.

Chapter 19
Shading Techniques

Shading depicts a variety of conditions in landscape illustrations, particularly light and depth. In order to properly shade a drawing, it is necessary to understand the vertical height of elements, as well as the source and direction of the light. The process of shading a plan can shed light on design decisions and how elements will react with one another spatially. Shading also communicates depth and volume, as well as the material quality of a surface or element.

Shading in Photoshop is accomplished using previous or saved fills and can be done manually with brushes or automated with strokes. The following methods focus on speed while maintaining accuracy when illustrating cast shadows and highlights.

Selecting Fills

Shading is applied using fills or saved selections as masks. This provides a template that allows the shading to be applied quickly. An entire layer can be selected by holding down the Ctrl key and clicking (Ctrl+click) on the Layer thumbnail in the Layers palette. This creates a selection based on the pixels that exist on that layer. If color fills are organized on layers, it is important that the layer containing the fill is not altered during the rendering process. The fill is then used as the selection every time that area needs to be isolated. It is also possible to add or subtract from the selection using multiple layers—use Alt+Ctrl+click to add and Shift+Ctrl+click to subtract from another layer. Using Ctrl+click to select the pixels on a layer is an extremely versatile technique that preserves layer transparency, allowing extremely complex selections to be created. This method works well if a color fill already defines a space within the drawing. Because the color fill is already using memory in the drawing, it does not require another channel or work path to redefine that space.

In order to make a selection based on a layer's pixels, you can do the following:

1. Highlight the layer that contains the pixels to be selected.
2. Ctrl+click on the Layer thumbnail to select the pixels on the current layer.

Figure 19.1. The Layer thumbnail is to the left and contains a preview of the layer's contents.

3. To add to the selection, simply hold down the Shift key and press the Ctrl key (Shift+Ctrl) when clicking on the thumbnail. To subtract from the selection, hold down the Alt key and press Ctrl (Alt+Ctrl) when clicking on the thumbnail.

Figure 19.2. When Ctrl+Alt or Ctrl+Shift are performed, a selection box with either a minus sign or a plus sign will appear when the cursor hovers over the Layer thumbnail.

Saving Selections

These selections can also be saved using two Photoshop tools: *channels* and *paths*. In order to create a new channel, first create a selection.

1. The selection can be made using any Photoshop method. After a selection is made, switch to one of the Selection tools in the toolbar (Lasso, Marquee, Magic Wand) and right-click in the selection on the canvas.
2. From the context menu, select Save Selection and give the selection a descriptive name.
3. This creates a new channel that is added to the current channels on the Channel palette.
4. The channel will be added below the already existing channels in the Channel palette. Depending on the color mode for the current drawing, the channels will be displayed as

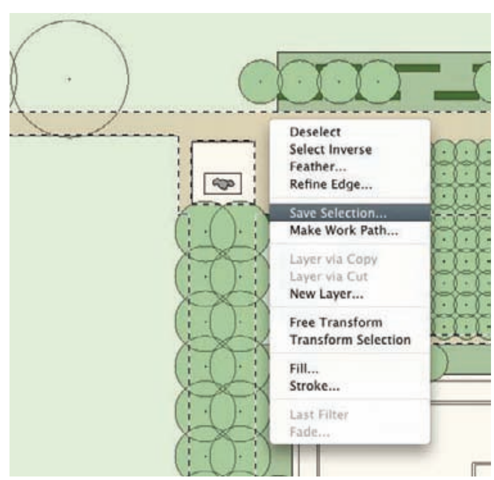


Figure 19.3. Choose Save Selection.

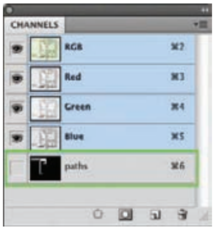


Figure 19.4. The saved channel appears below the existing channels.

Figure 19.5. The Selection button at the bottom of the Channel palette.

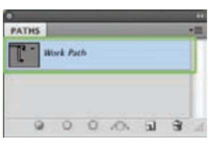


Figure 19.6. Save the work path and access it through the Paths palette.

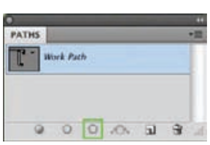


Figure 19.7. Reactive the selection with the Selection button.

either an RGB composite with individual Red, Green, and Blue channels or a CMYK composite with individual Cyan, Magenta, Yellow, and Black channels, with the saved selections as channels below.

5. Channels work well when a color fill is not needed to define an area but a mask is necessary to define a space.
6. A channel will use less memory in an illustration because it is defined with shades of gray rather than RGB values. The selection can be recalled by Ctrl+clicking the Channel thumbnail or by selecting the channel and clicking the Selection button at the bottom of the Channel palette.

Work paths can also be used to define a selection, but they do not preserve layer transparency like layers or channels. The work path is a vector approximation of the current selection.

1. To create a work path, make a selection, switch to one of the Selection tools in the toolbar (Lasso, Marquee, Magic Wand), and right-click in the selection.
2. From the context menu, select Save Work Path and choose a resolution to approximate the vector path. The work path will be saved in the Paths palette, and the path can be activated by selecting it in the Paths palette.
3. The selection for that path can be activated using the Selection button at the bottom of the palette.

Paths are versatile in that they are vector interpretations; this means that they can be edited using the vector-editing tools, such as the Pen, and can be used to define strokes that will be used to shade edges of spaces.

To begin shading, it is important to determine the source of light and the direction it will be casting shadows. Typically, for site renderings the light source is in the upper-left corner and casts light to the lower-right corner. It is also important to determine relationships between the elements and the ground plane; shadows and shading allow the viewer to determine topography and height. For example, shadows cast from objects must attach themselves to the object footprint if the object rests on the ground; otherwise, the object will float above the ground plane. Likewise, tree canopies and building awnings or overhangs must cast a detached shadow the length of which corresponds to the object's height. Shadow lengths are proportional and specific to each rendering. This means that if a building has a specific shadow length and a tree rendered next to that building is twice as the tall, the shadow should also be twice as long. In some cases where shading is applied to the ground plane, the shading may not represent specific shadow lengths but instead will be used to illustrated depth; therefore, artistic license can be exercised when creating shaded surfaces.

To apply shading to an area, it is best to make a selection using one of the previously described methods. For example:

1. Ctrl+click the fill layer in the Layers palette; this creates a selection based on the pixels on the Fill layer.

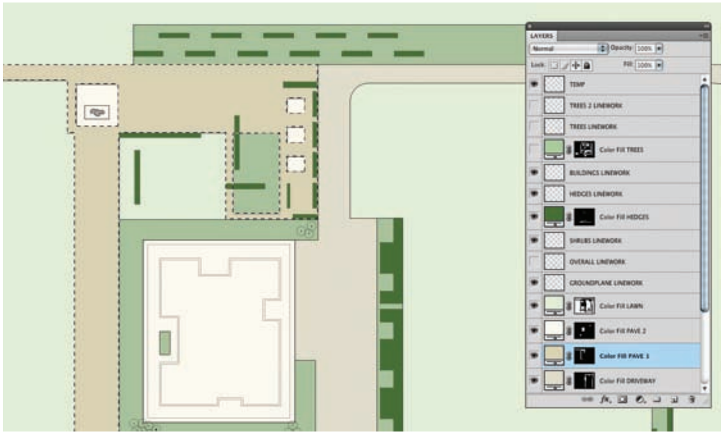


Figure 19.8. Select layer pixels in the Layers palette.

2. Select the Brush tool and then adjust the size and hardness, or select a brush preset for the scale and texture of the current area to be shaded.

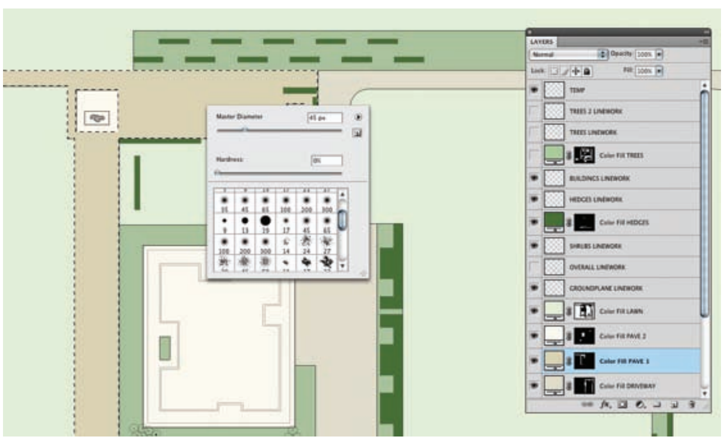


Figure 19.9. Selecting a brush preset.

3. A very fast way to begin shading an area once the Brush tool has been selected is to use the Eyedropper. Hold down the Alt key, which will change the Brush tool to the Eyedropper temporarily. Using the temporary Eyedropper, sample the fill color and then double-click the foreground color swatch to bring up the Color Picker. Select a saturation and brightness level that is much darker than the current color; the color should be darker than the desired shading effect.
4. Create a new layer and make that layer active. Using the Paint Brush Tool, quickly trace the edges of the area to be shaded, applying shading to simulate light falling on the surface, typically darkening the southeastern edge of lower areas the most.

How the shading is applied is dependent on the surface being rendered and the style of illustration.

5. The shading will be very dark at this point and require adjustment. Because the shading was applied with a color that was darker than necessary, the opacity can be used to adjust the shading in order to get the desired effect. As the rendering progresses, the shading layers can be readjusted to make them lighter or darker. The layers can also be adjusted after printing if the shading is not dark enough or is too intense.
6. Successive layers of shading are used to further refine the shading. The first pass should lay down a field of shading, with successive passes further defining site features. The smaller brush sizes can be used to add detail and clarity.

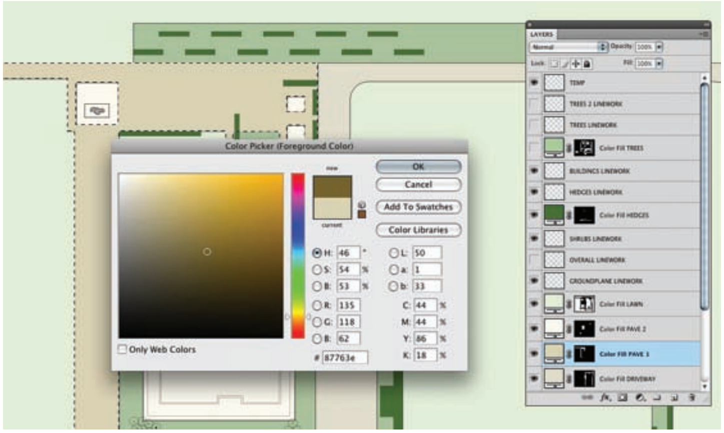


Figure 19.10. Select shade with the Eyedropper and make it darker than the intended final result.

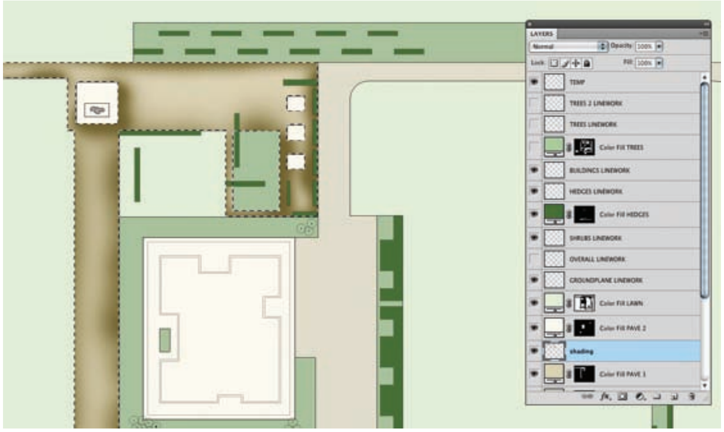


Figure 19.11. Shaded edges of area.

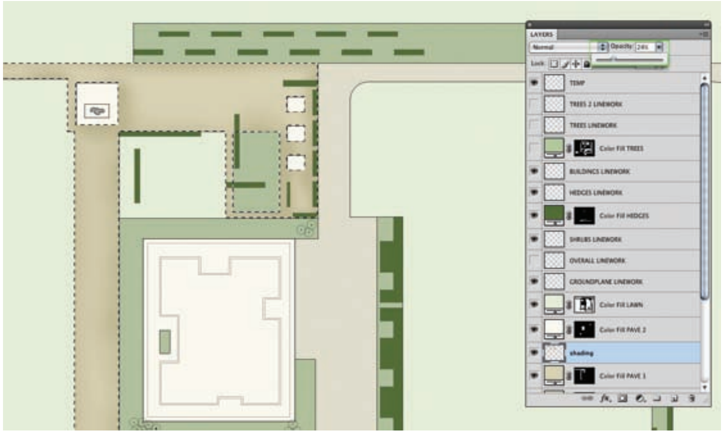


Figure 19.12. Adjusting the shading opacity.

Figure 19.13. Successive shading passes.

Automating the Shading of Edges

The process of shading a plan adds richness and depth, but in some cases the edges to be shaded can be very large—for example, a masterplan with many miles of roadways and parking. Applying shading to all the edges would be extremely time-consuming. To save time and allow experimentation, a single brush stroke can be applied to an entire edge automatically.

1. Create a selection around the area to be shaded (either use a saved selection or simply Ctrl+click the Layer thumbnail to select the pixels).
2. Make sure that one of the Selection tools is active (Lasso, Magic Wand, Marquee), right-click within the selection, and choose Save Work Path.

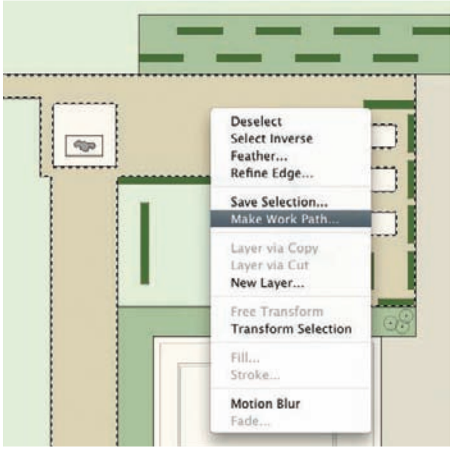


Figure 19.14. Choose Save Work Path from context menu.

3. Select the Paint Brush tool, and then select a brush preset or create a new brush using the Brush palette. The purpose is to create a brush that will render a random edge rather than a perfectly aligned stroke. A random edge can be generated using the brush dynamics and irregular brush tip shapes.
4. Choose the color desired for shading the edges, create a new layer, and make it active. As explained previously, the color should be darker than the desired shading.
5. Open the Paths palette and make the previously saved path the active path. Press the Selection button at the bottom of the Paths palette. This will make a selection from the current path and keep the shading that is applied next within the desired area.

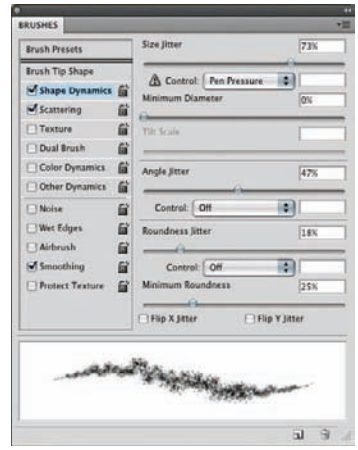


Figure 19.15. The brush stroke is selected to shade the edges.

6. Switch to the Pen tool and right-click on the canvas. Select Stroke from the context menu, and then select Brush in the next dialog box to apply the current Brush settings to the stroke.
7. The edge of the work path should be shaded. Adjust the layer opacity in the Layers palette to tone down the shading effect. Deselect the current area using Ctrl+D. If the results are not quite right, delete the Shading layer, adjust the brush and color, and try again.

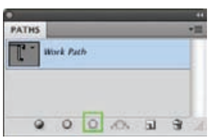


Figure 19.16. The path is selected in the Paths palette.

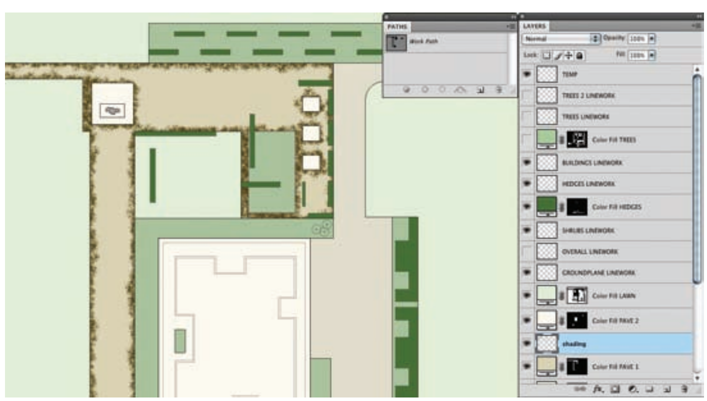


Figure 19.17. Shading is applied to the edges.

Large areas can be shaded using layer effects such as Drop Shadow, Bevel, and Emboss. This is a very quick method to create a shading effect, but it lacks the richness of using a brush that utilizes the brush's ability to adjust spacing, scatter, and create patterns. See Chapter 21 for more information on creating custom brushes.

Chapter 20
Creating Textures

Landscape renderings require a range of textures to express the relationships between materials, depths, and surfaces. These relationships often have ambiguous boundaries with layered materials requiring versatile approaches to atypical conditions. Analog media has traditionally approached texturing as a layered system, applying media in order to develop mixes of color or intensity in shading. Digital media uses similar methods that also create relationships between layers with screening modes and opens the possibility to edit the texturing throughout the illustration process.

Creating a Texture from an Existing Photograph

Creating textures in Photoshop is accomplished through a variety of tools. Using images obtained from site photography is an obvious method to quickly create large areas of texture. This type of texture can be abstracted in order to cover a large area of the site to convey a surface's material. When an image is used, it is important that either the scale of the texture is correct or that the image is altered enough that the material scale is not discernable. The following technique explains how this might be applied:

1. With the Photoshop rendering file open, open the file that will be used for the texture. Arrange the workspace windows so that they are next to one another, and use the Move tool to drag the image into the illustration.
2. Position the image in the area where the texture will be applied. After it has been positioned, turn off the Texture layer in the Layers palette.
3. Make a selection that represents the area where the texture will be applied. If a base color has already been applied, this can be done using any of the Selection tools or by Ctrl+clicking the Layer thumbnail.
4. At this point, turn the Texture layer back on and make it the active layer. Create a new *layer mask* using the button at the bottom of the Layers palette. This will create a mask based on the selection that was just made. The selected area will be visible and the unselected areas will be masked. Masks

Figure 20.1. This grass meadow image will be used as a texture to represent grass.

are a good way to create boundaries for textures. Because they don't actually delete pixels, it is possible to readjust the texture position or to change the mask if necessary.

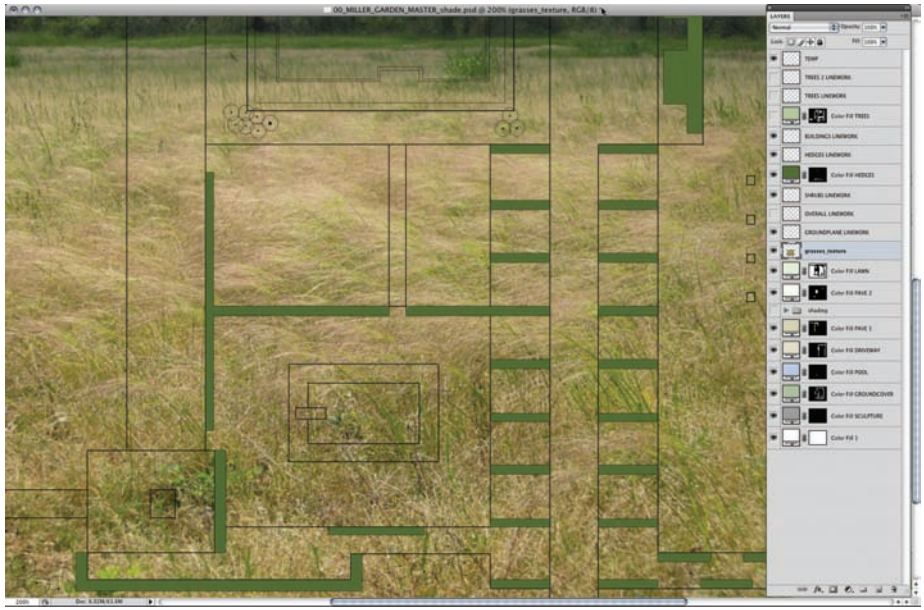


Figure 20.2. The picture is positioned over the area where it will be used in the rendering.

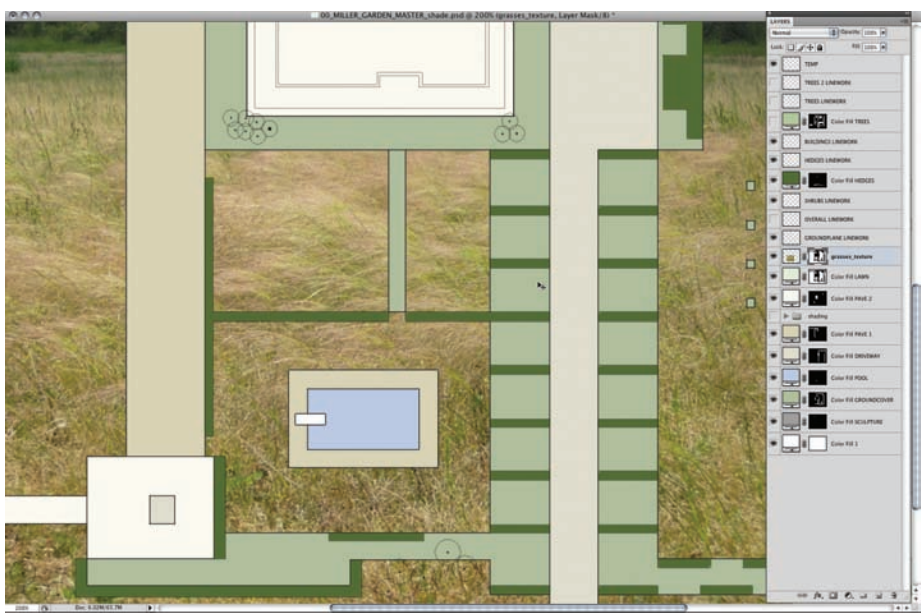


Figure 20.3. A layer mask is created to mask the image within the desired area.

5. In order to adjust the position of the texture, it is necessary to unlink the image from the mask. This can be accomplished by clicking the Link button between the Layer thumbnail and the layer mask in the Layers palette. Select the Layer thumbnail; using the Move tool, it is now possible to move the Texture layer in order to reposition it.
6. The Texture layer can be adjusted using the Blur filter to abstract the texture and/or adjusting the opacity.

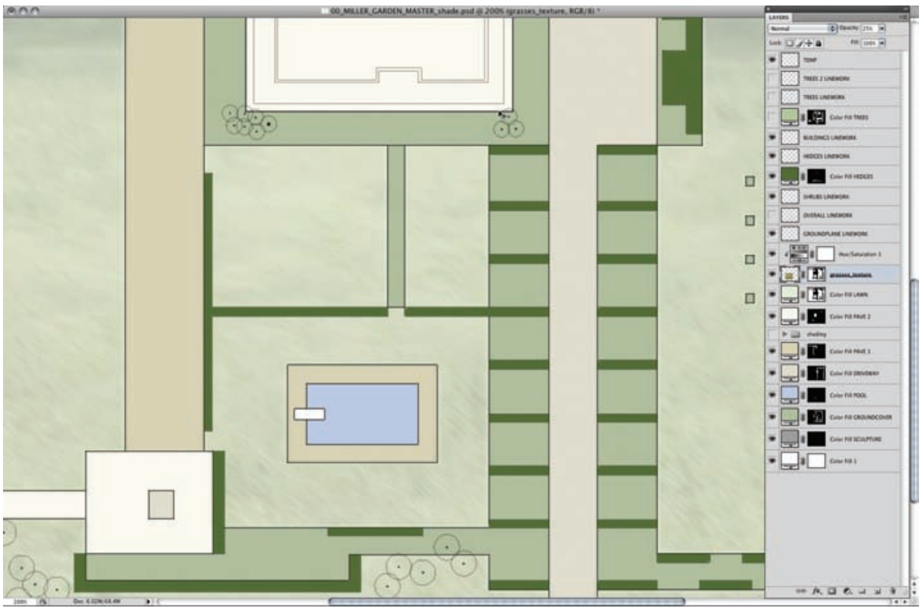


Figure 20.4. The Opacity of the texture is adjusted to 25 percent, the Hue is adjusted, and a motion blur is added.

Creating a Seamless Pattern Using the Offset Filter

Patterns are helpful when creating a large field of repeating texture. Finding an image that represents the field is often difficult; however, if a small area is available, a pattern can be built. If the image is not evenly shaded, the result is a noticeable tiling effect. Because an evenly lit image is needed to create a seamless pattern, adjustments need to be made to remove any variations in lighting. This can be accomplished using the following method.

Figure 20.5. The photo used to create a pattern.

1. Open the file that will be used to create the pattern. **Select Image > Image Size** and determine the image's size. The image size must be

divisible by 2 for the next step. The image size can be adjusted directly in the Image Size dialog box: either go up or down 1 pixel to make the number of pixels an even number. If the height and width are not the same, make note of the smallest dimension and close the Image Size dialog box by clicking OK.

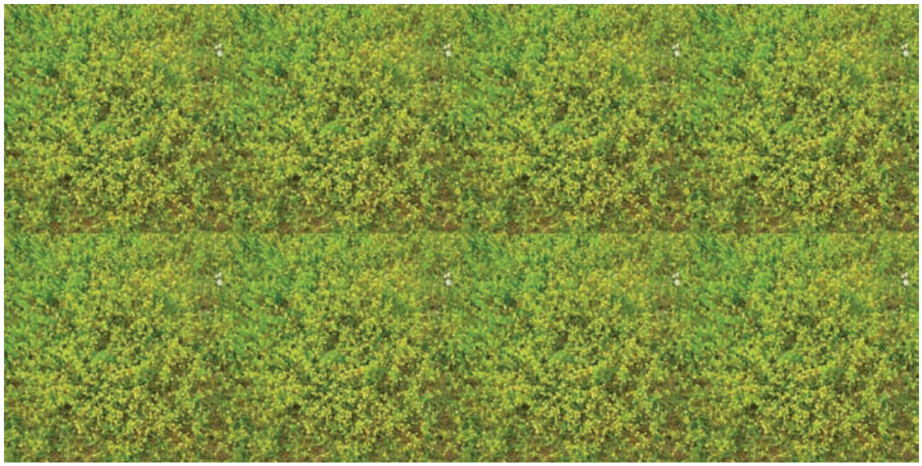


Figure 20.6. When tiled, the photo displays noticeable seams.

2. **Select Image > Canvas Size** and adjust the canvas size so that the longer dimension equals the short dimension. This will crop off a portion of the image, so be sure you select the side you want to crop using the dialog box and then click OK. This will create an image that is perfectly square and divisible by 2.

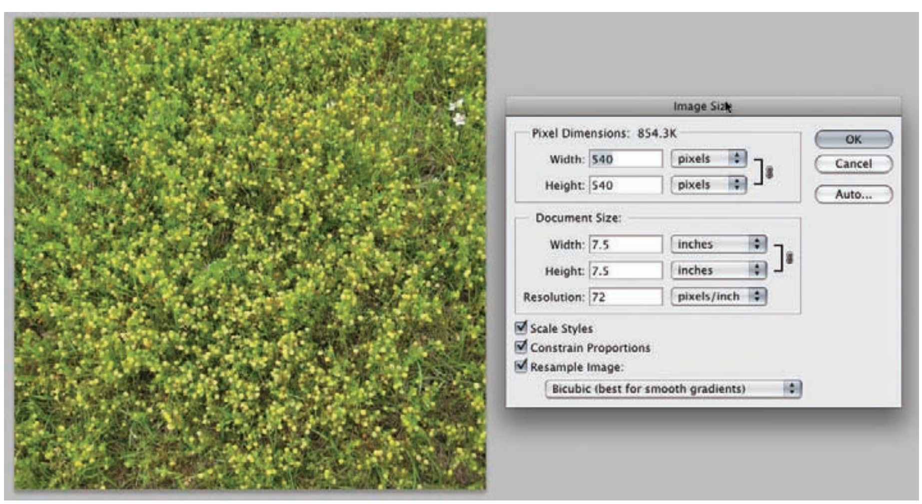


Figure 20.7. The photo is resized to a square dimension that is divisible by 2.

3. Use the Offset filter to offset the image. **Select Filter > Other > Offset**. In the dialog box, enter the number of pixels to offset in the horizontal and vertical directions—this will be half the image size. Make sure that Wrap Around is selected and click OK. The image will be offset by half, which will push the image up and to the right and then wrap the pixels around to meet in the middle, effectively putting the edges into the center of the image.

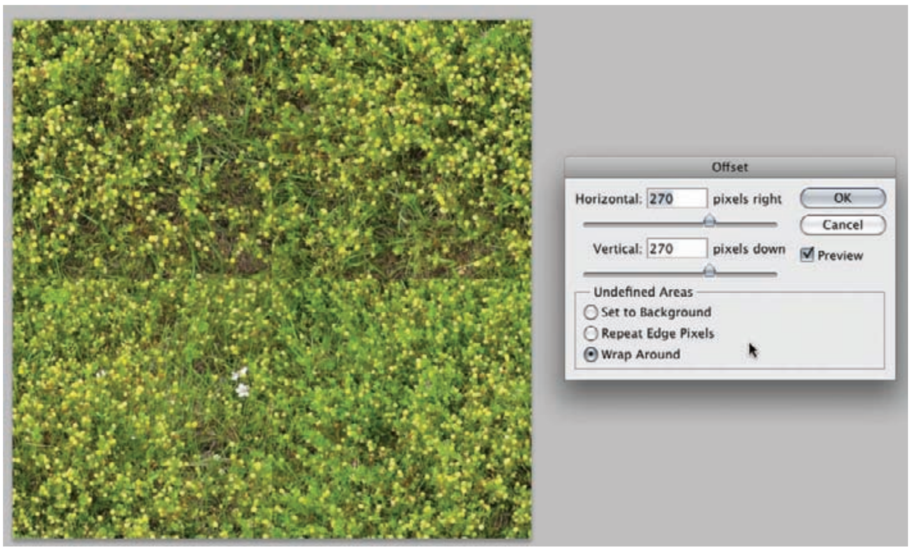


Figure 20.8. The Offset filter is used to push the edges of the image to the middle.

4. Use the Clone Stamp tool to even out the center edges, creating a smoothly shaded texture. When using the Clone Stamp tool, hold down Alt and click to select the area to be sampled. Release Alt and the next click will determine where the pixels will be painted. It is best to use longer strokes if possible to avoid a repeating pattern.
5. After the edges have been smoothed, reapply the same Offset filter to move the edges back to the center. If the center has been altered, the Clone Stamp tool can be used again to finish smoothing—just be careful not to alter the edges.
6. Save this texture as a new file, so that it can be used again.

Figure 20.9. The Clone Stamp tool can be used to match the edges in the middle. When they are matched, use the Offset filter again to put the edges back to their original positions.

Figure 20.10. The final texture tiles are smoother than in the original version.

Creating the Pattern and Applying It to the Rendering

A pattern can be created from any image with the Define Pattern command, and that pattern can be applied with the Paint Bucket, Pattern Stamp, or Pattern Overlay layer style.

1. Once the pattern is created, it cannot be edited, so it is important to scale the image for the current rendering. Drag the newly created, seamless pattern into the rendering and scale it using the Free Transform tool (Ctrl+T). If the pattern will be used as a pattern overlay, this step can be skipped and the pattern can be created directly from the source file.

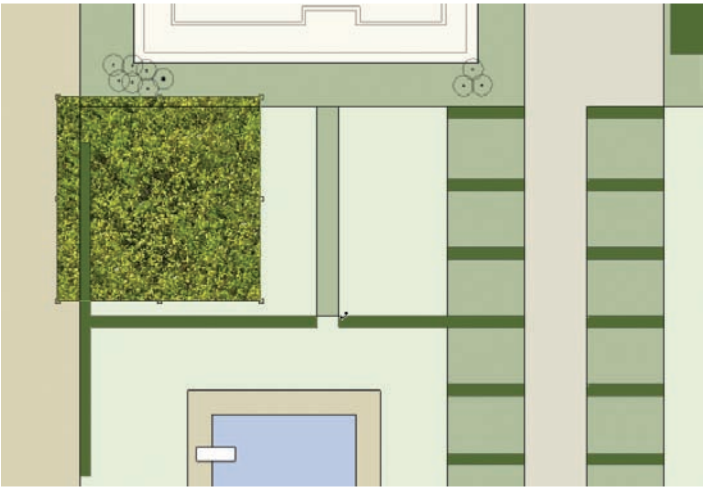


Figure 20.11. The Free Transform tool is used to scale the texture to the correct size in the image.

2. Select the texture by drawing a square marquee over the texture. Make sure the Texture layer is above all the other layers. Select **Edit > Define Pattern**, and name the pattern in the dialog box that appears. The pattern will be stored in Photoshop's default Pattern Library. The Texture layer can be deleted or turned off at this point.

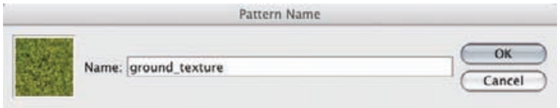


Figure 20.12. When creating the pattern, enter an appropriate name to identify the swatch.

Three basic methods can be used to apply the pattern to the rendering: the Paint Bucket method, the Pattern Stamp method, and the Pattern Overlay method.

Paint Bucket and Pattern Stamp

The Paint Bucket and Pattern brush are two familiar tools that can also apply patterns. These tools provide all of their normal functionality, but instead of applying color will apply the selected pattern to the rendering.

1. Select the Paint Bucket tool (press G or Shift+G to change from the gradient to the Paint Bucket). From the pull-down on the top toolbar next to the Paint Bucket icon, choose Pattern as the fill type.
2. Select the pattern to use for the fill by clicking on the swatch next to the pull-down. The Paint Bucket tool can now be used to fill areas with the selected pattern. Remember to make a selection before filling unless a pixel boundary is available, and remember to put the pattern on a new layer.

Figure 20.13. Choose Pattern from the Paint Bucket pull-down list.

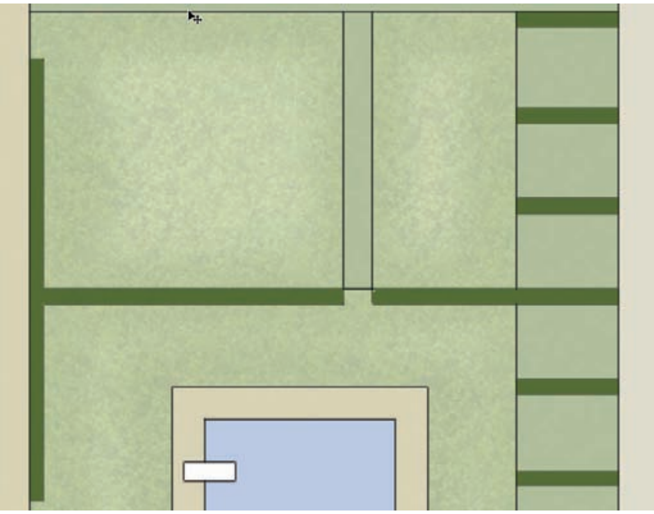


Figure 20.14. The texture is blended with the green base color using layer opacity for shading.

The Pattern Stamp works in a similar method to the Paint Bucket. The pattern type can be specified in the toolbar, and the pattern can be painted into the illustration. This method is extremely useful to touch up areas of the rendering that were not filled properly with the Paint Bucket. Because the Pattern Stamp is a brush-based tool, it is also possible to use any of the brushes or even define a new brush to apply the pattern.

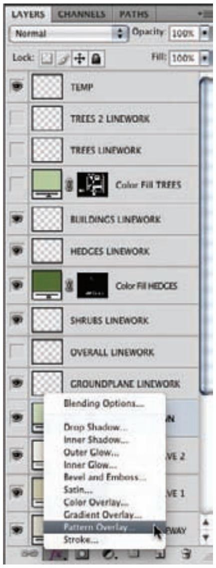


Figure 20.15. Add a new Pattern Overlay style from the Layers palette.

Pattern Overlay

Using a Pattern Overlay layer style is an extremely versatile method for applying patterns. A layer effect is applied to a layer and affects every pixel on that layer; the pattern overlay will apply the pattern to all of the pixels on the layer. The areas need to be filled or painted with a base color before the Pattern Overlay layer style is applied.

1. Select the layer that contains the pixels for the Pattern Overlay effect. Apply a new Pattern Overlay style by clicking the button at the bottom of the Layers palette and selecting Pattern Overlay.
2. The Layer Style dialog box will appear with the pattern overlay applied. The pattern can be selected from the pattern swatches. There are settings to adjust the Blend mode and Opacity; they will affect the pattern overlay in relation to the pixels on the current layer. The texture can also be scaled at this point; it is best not to scale the texture up because pixelation can occur if the scale is increased beyond 200 percent. After selecting and adjusting the pattern, click OK.
3. Layer styles are fully adjustable. To make an adjustment, double-click on the layer style in the Layers palette and the Layer Style dialog box will appear. Click on the layer style to make it active, and make the necessary adjustments.

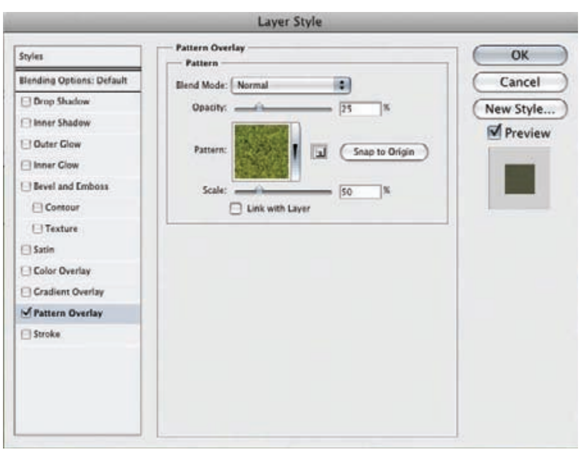


Figure 20.16. The Layer Style dialog box.

After the Pattern Overlay style is applied, the layer's overall opacity can be adjusted in the Layers palette. Using the Fill adjustment in the Layers palette, it is possible to adjust the application of only the layer styles; doing so will affect all of the layer styles that are currently applied to the selected layer.

Managing Patterns

Patterns can be managed using the Preset Manager (**Edit > Preset Manager**). The Preset Manager provides access to presets that are applied to a variety of tools. The Patterns preset is available in the pull-down; from this menu, it is possible to load new patterns from PAT

files (.pat) or save selected patterns to a new PAT file. This is a good way to share patterns or load patterns from others.

Texturing with Filters

It is also possible to create texturing using a variety of other techniques that do not involve a source image. This typically involves using one of the filters in order to generate a texture and then manipulating the result. Filters change the appearance of the image and are applied to the current layer or selection within a layer. Filters work well because they can cover a large area with texture and do not require a pattern. Because the filters are applied based on a mathematical formula, the results are random and will not create tiling effects. In order to create a texture with a filter, consider the following example.

1. Select the layer that contains the pixels to which the filter will be applied. Duplicate the layer and make the duplicated layer active. Select **Filter > Noise > Add Noise**. In the Noise Filter dialog box, change the noise type to Monochromatic and increase the Noise Amount beyond the desired effect. When finished, press OK. This applies the Noise filter to a new duplicate layer.

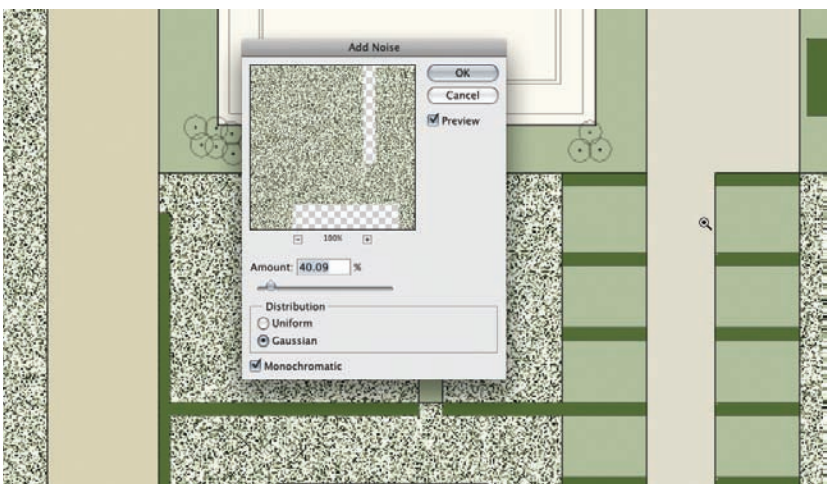


Figure 20.17. The Noise filter is applied to a layer to create a texture.

2. The opacity of this layer can be adjusted to blend it with the original layer. By applying the Noise filter heavier than necessary, the effect can be adjusted using the Layers opacity; this allows flexibility as the illustration progresses.
3. It is also possible to use screening modes, such as Screen or Multiply, for the layer. The normal screening mode does not interact with the layer below, but Screen and Multiply do—by either lightening or darkening pixels, respectively.

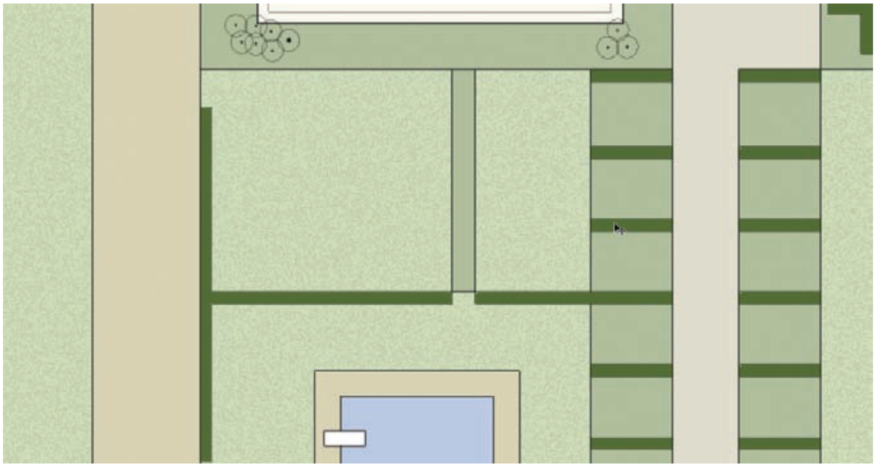


Figure 20.18. Layer opacity is adjusted to blend the Noise layer with the green fill layer below.

4. It is also possible to add a mask to a layer in order to change the effect of the filter. This can make the filter heavier in some areas or remove it completely from others. To add the mask, select the layer and click Add Mask at the bottom of the Layers palette. If nothing is selected, the mask will be added as a completely white mask, meaning that everything is visible. If a selection is in place, it will create a mask for the selected area. Make the mask active by selecting it, and paint black to mask areas or white to unmask them. It is also possible to use shades of gray to make other areas partially transparent—this technique is similar to a feathering effect.

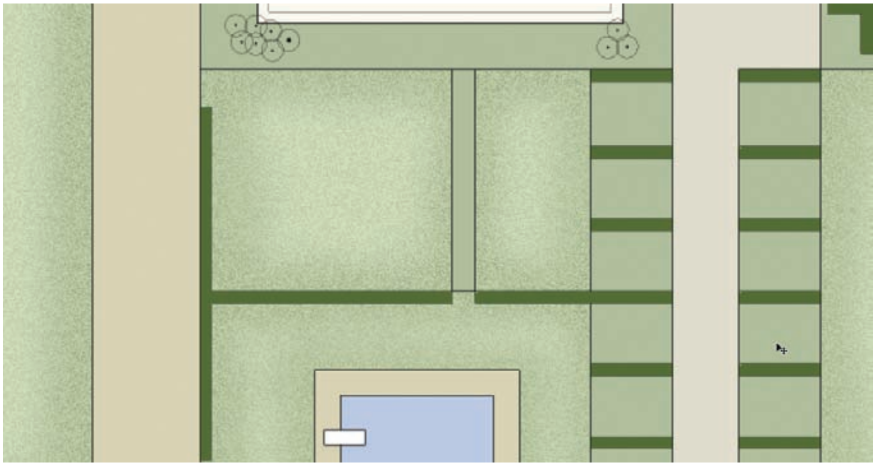


Figure 20.19. Several layers of noise, shading, and masks are used to create shaded edges.

A filter can also be altered by adding another filter—for example, pixels modified by the Noise filter can be modified by a second, third, or fourth filter. This can create interesting effects that are much more customized for specific situations.

Chapter 21
Brushes

The Brush tool is one of the most powerful tools for creating renderings in Photoshop. Brushes allow a more direct contact with the drawing and can create textures and nuances that other techniques cannot. Mastering the use of brushes opens a range of possibilities for rendering in Photoshop. A wide selection of predefined brushes come standard in Photoshop, numerous brushes can be downloaded from the Internet.

Brushes can also be created from scratch within Photoshop. Creating custom brushes offers almost limitless control over the type of brush used in a drawing. Custom brushes can also be saved and used on future projects, allowing an office to create a palette of brushes that are standardized. Using the Tool Presets options allows standard office brushes to be saved using the same colors, sizes, and other options on different drawings by several different team members who might work on the same drawing.

Standard Brushes

To use a standard brush, choose the Brush tool from the Tools palette. The options for the Brush tool include a set of predefined brushes from which to choose. Most of these brushes have two standard settings that can be altered to make the brush have different effects. The first setting is the Pixel Diameter, which is simply the size of the brush. The second is the Hardness of the brush. This option affects how crisp the edge of the brush is. To create straight segments using the Brush tool, click on an area of the drawing, hold Shift, and click on another area of the drawing.

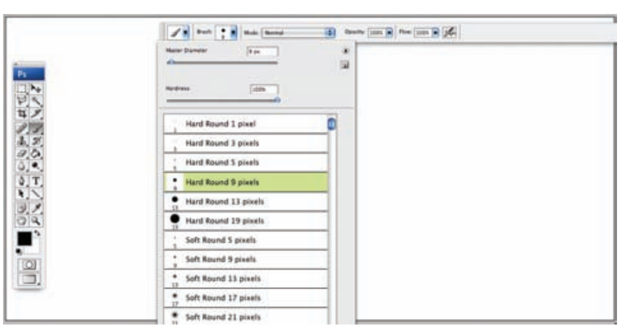


Figure 21.1. The standard options for most brushes are the Pixel Diameter and the Hardness of the brush.

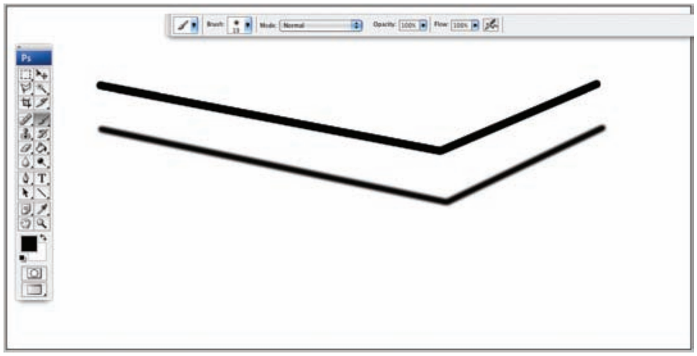


Figure 21.2. Both brushes in this figure are 19 pixels in diameter. A brush with the Hardness set to 100 percent was used to create the upper line. The lower line was created with a brush with the Hardness set to 0 percent.

Some predefined brushes, such as the Dune Grass brush, do not have an option for hardness. The settings for these brushes are controlled using the Brushes palette. The Brushes palette can be found under **Windows > Brushes**.

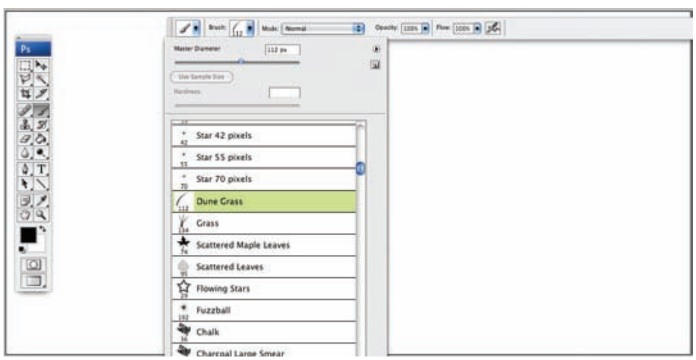


Figure 21.3. Some predefined brushes, such as the Dune Grass brush, do not have an option for hardness.

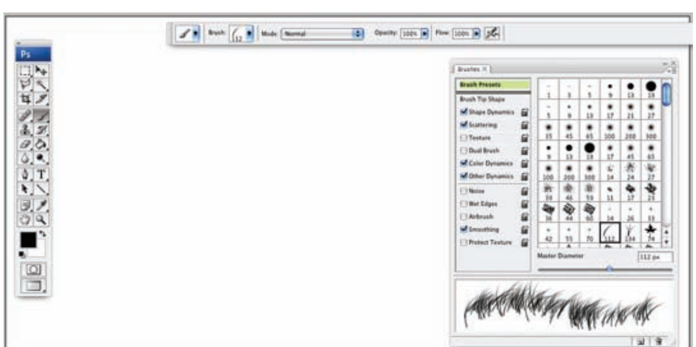


Figure 21.4. The settings for these brushes are controlled using the Brushes palette.

The Brushes palette has several options for adjusting the effects of the brush. Not all of the settings are important for general work in a design office. Only the critical and most useful settings will be covered in this section. The following example will demonstrate each section and how it affects the look of the brush:

1. The upper line painted in the example figure shows the initial, predefined settings of the Dune Grass brush. This is how the brush will look when it is first chosen. The upper line will remain the same throughout all of the examples as a reference point for comparing the changes.

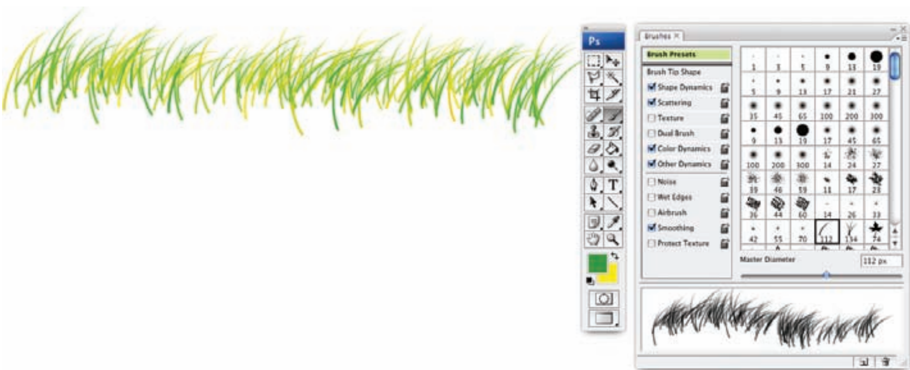


Figure 21.5. The initial settings for the Dune Grass brush are shown in this figure. The upper line in all subsequent figures will have the initial settings shown for the upper line. This will allow comparisons to be made to the altered brush settings.

2. The Brush Tip Shape option (the second option down on the list to the left of the Brushes palette) controls the spacing and the orientation of the brush. The spacing of the brush affects the density. The orientation affects the angle of the brush stroke.

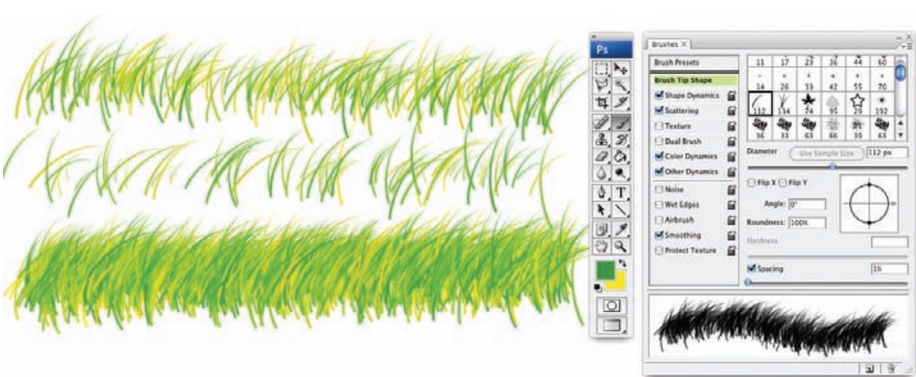


Figure 21.6. The middle line has the Spacing set to 72 percent; the lower line has the Spacing set to 1 percent.

Figure 21.7. To change the angle of the brush, Click+drag the edge of the circle in the middle-right side of the Brushes palette or enter a value in the Angle box. The middle line has the angle changed to –42 degrees, and the lower line has the angle changed to 121 degrees.

3. The next option in the list is the Shape Dynamics. The *dynamic controls* of a brush control the randomness of the brush stroke. This creates the appearance of a random and natural pattern in the brush stroke and is useful for drawing materials. *Jitter* in this context has a similar meaning to "amount of randomness." The higher the Jitter setting, the more random the effect will appear. For example, the Size Jitter setting in the initial settings of this brush is set to 100 percent. That means that each "blade" of Dune Grass will have a random size, from very small to the full height of the brush as defined by the Pixel Dimensions. By setting the Size Jitter to 0 percent, all of the "blades" of the Dune Grass will be the same size.

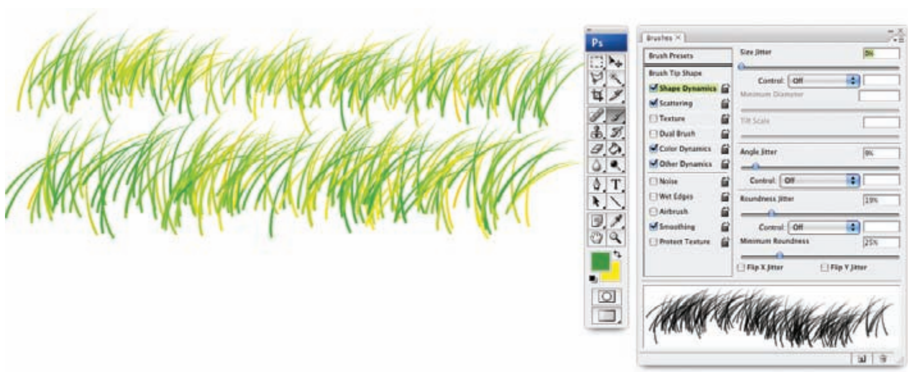


Figure 21.8. With the Size Jitter set to 0 percent, all of the "blades" of Dune Grass will be the same size. In the lower line, each element in the brush stroke is the same size; in the upper line, some elements are smaller than others.

4. The Angle Jitter controls the randomness of the angle at which the brush is rotated. In the Brush Tip Shape setting, the initial angle of the brush is set. In the Angle Jitter setting, the amount of random rotation is established.

Figure 21.9. The initial setting for Angle Jitter for the Dune Grass brush is 9 percent. This causes the brush to be randomly rotated to within 9 percent of its standard angle. In the middle line, the Angle Jitter is set to 0 percent, preventing the brush from being randomly rotated at all. In the lower line, the Angle Jitter is set to 100 percent. At 100 percent, each "blade" of Dune Grass is randomly rotated between 0 and 360 degrees.

5. The next option in the list is Scattering. Scattering controls how "loosely" the line is painted. A larger Scatter setting will spread out the "blades" of Dune Grass further from the area where the line is painted.

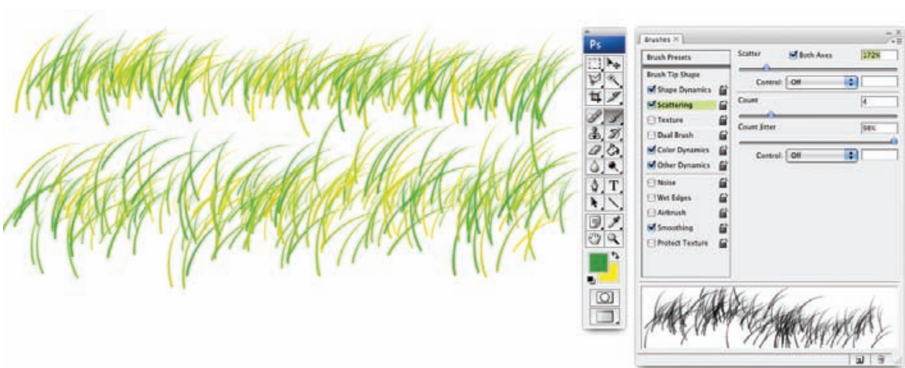


Figure 21.10. The Scatter setting is increased for the lower line. The painted line is "looser" than the line above.

6. The Count is how many "blades" of Dune Grass are painted each time the brush passes over an area. It is similar to setting the density of the brush with the Spacing option.
7. The Color Dynamics option controls the randomness of the brush color. The Foreground/Background Jitter determines how much the foreground color and background color are mixed. The foreground and background color are set in the Tools palette.
8. The Hue Jitter, the Saturation Jitter, and the Brightness Jitter create random values for these three color settings.

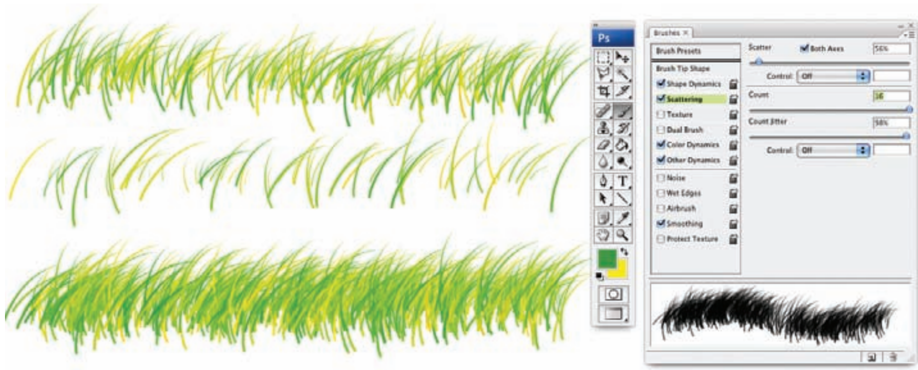


Figure 21.11. The initial setting for the Dune Grass brush has a Count of 4. The middle line has a Count of 1, which makes the brush less dense. The lower line has a Count of 16, which makes the brush denser.

Figure 21.12. The initial setting for the Dune Grass brush is 100 percent. The middle line shows the effect of setting the Foreground/Background Jitter to 0 percent. This makes all of the "blades" of grass be the foreground color. The lower line has the Foreground/Background Jitter set to 47 percent, which mixes the foreground and background colors to a different degree.

Figure 21.13. The middle line has all three color Jitters set at 100 percent. The lower line has the Hue Jitter set at 100 percent. This creates a random hue adjustment to each "blade" as it is drawn.

9. The Other Dynamics option offers one valuable setting: the Opacity Jitter. The Opacity Jitter randomly sets the opacity of each "blade" as it is being drawn.

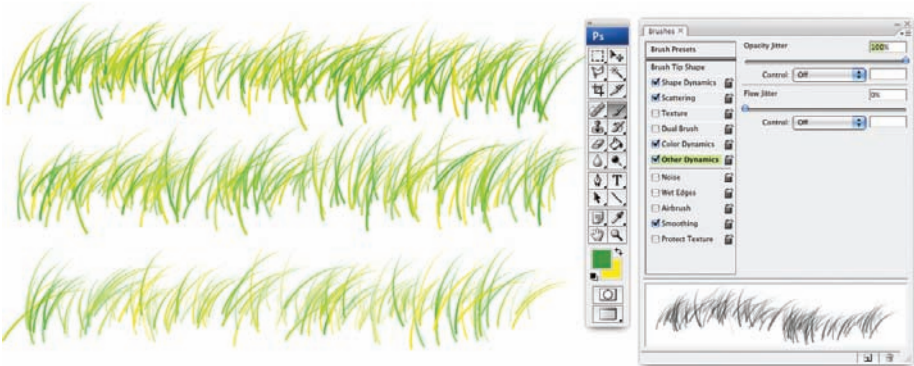


Figure 21.14. The middle line has the Opacity Jitter set to 50 percent. The lower line has the Opacity Jitter set to 100 percent. This creates a random transparency in the brush, which allows the brush to be blended with other brushes while painting.

Figure 21.15. The ground plane of this image was rendered using the Dune Grass brush.

Brushes can be used in a design drawing in a number of ways. Most often, Grass Brush or similar brush styles are used to render a ground plane. The ground plane in the following figure is rendered using the Dune Grass brush using multiple layers of brush strokes. The technique involves creating several layers of brush strokes, each with a slightly different color combination. Each layer is then set to a medium Opacity, around 50 percent, which allows the different layers of brush strokes to blend together.

Figure 21.16. Making several layers of brush strokes and setting the Opacity of each layer to 50 percent created the ground plane. This allows the different layers to blend together to create the overall effect.

Custom Brushes

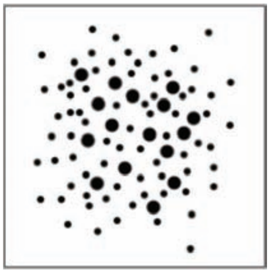


Figure 21.17. Draw a pattern to create the Brush Tip. The Brush Tip must be drawn in black.

Custom brushes are powerful tools that can be used to create a variety of effects. In essence, all of the predefined brushes are created in the same way that a custom brush is created. Each brush starts with a single element, or "brush tip." In the case of the Dune Grass brush, the brush tip is a single "blade" of grass. The brush tip is repeated as the brush is applied according to the settings in the Brushes palette, as shown in the previous examples. Consider the following example:

1. The Brush Tip can start out as either a single line or shape, or a combination of shapes. To create the brush, create a new file, choose a black brush, and draw the element.
2. Select the entire drawing by pressing Ctrl+A. Select **Edit > Define Brush Preset** from the menu. Name the brush.

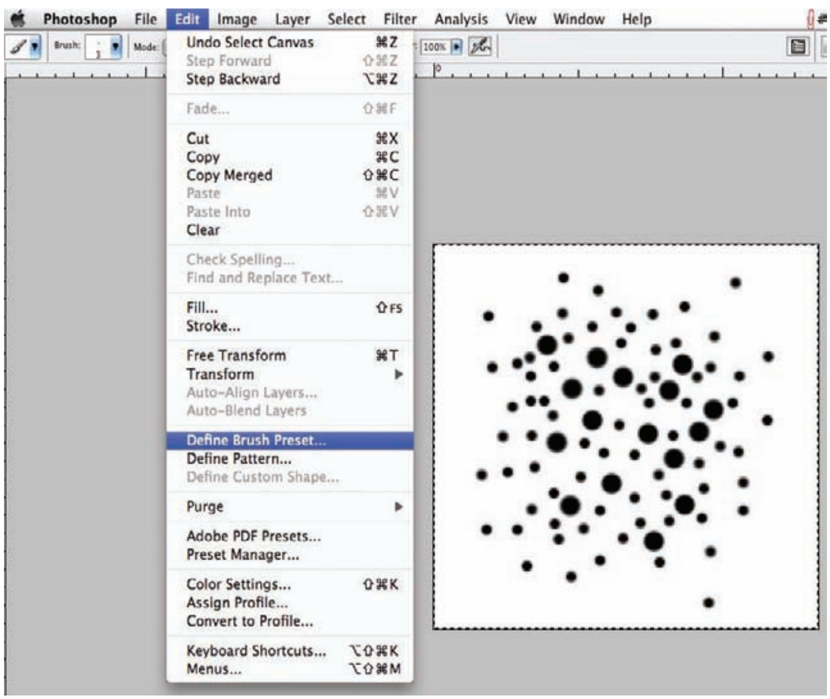


Figure 21.18. Select the entire drawing and define the Brush Preset.

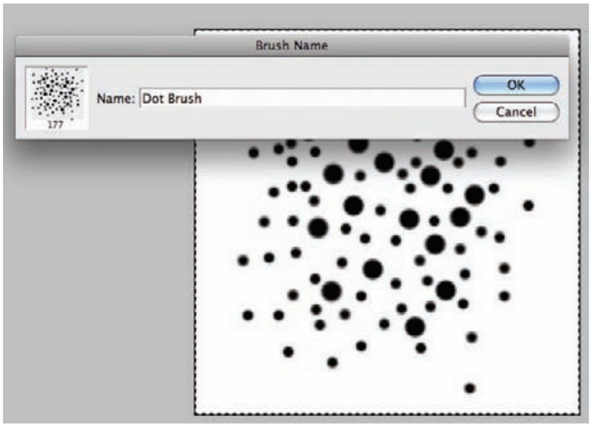


Figure 21.19. A dialog box that allows the brush to be named will appear. The brush will appear in the list of predefined brushes in the Brush Tool options. The newly created brush typically appears at the bottom of the list.

3. Once the brush has been created, choose a color for the brush from the Color Picker. The brush can be used in various sizes.

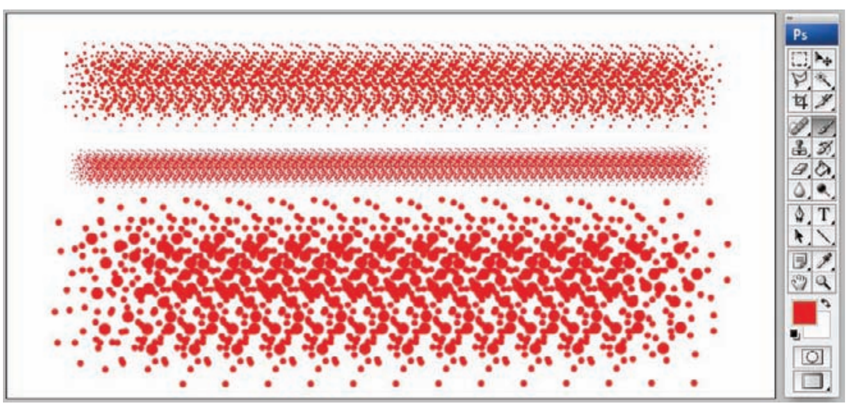


Figure 21.20. When a color is selected and the Pixel Dimensions are changed, the brush can be used as a Rendering tool.

4. Changing the settings of the brush using the Brushes palette can create many different effects for the brush.

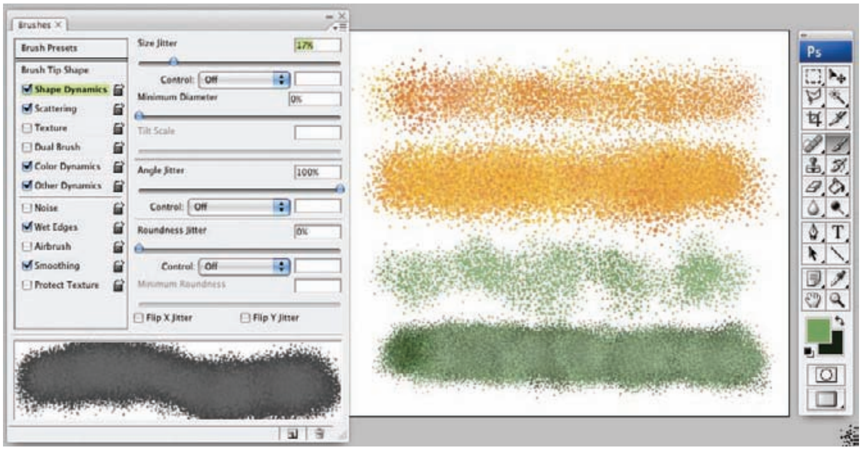


Figure 21.21. Changing the settings creates several different types of brushes from a single Brush Tip.

5. To save a particular setting for a newly created brush, create a new Tool Preset. The Tool Preset menu can be found under **Windows > Tool Presets**.

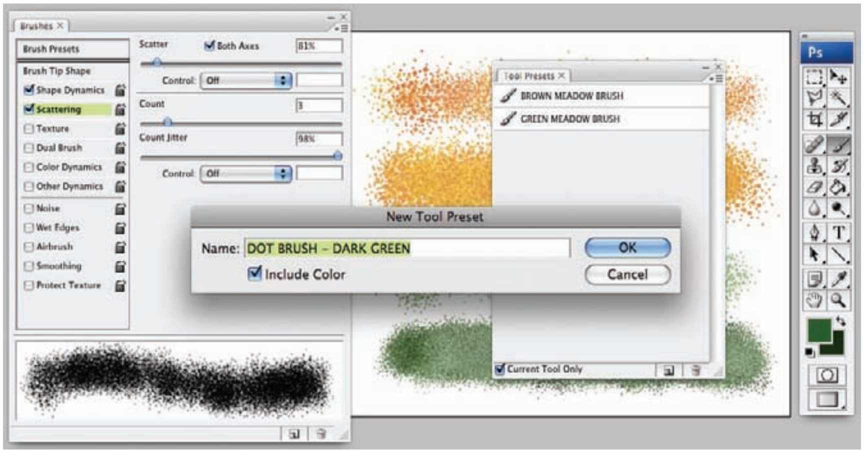


Figure 21.22. To save a particular combination of brush settings, create a new tool preset from the brush. The color, size, and other settings will be saved to use later in the drawing.

Chapter 22
Plan Symbols with Smart Objects

When any type of rendering is being created, many elements (typically plant symbols or images, entourage, or icons) are often repeated. These elements, which are often placed, scaled, and rotated with great precision, are copied many times within an illustration. Creating multiple copies is extremely simple; but if possible, this laborious process should not be repeated during the representation process—at least not too many times. *Smart objects* in Photoshop function in a similar manner to symbols in Illustrator or blocks in AutoCAD. They allow the user to update one instance of an object and have the changes propagate throughout the drawing. The other advantage to using smart objects is that the original object maintains the resolution that it had when it was first created. This means the smart object can be scaled down without losing pixel resolution, so that in the future it can be scaled back up again if necessary.

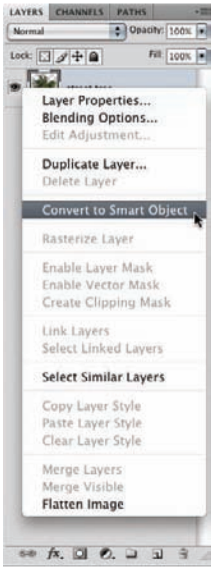


Figure 22.1. Right-clicking on the layer will reveal the options. Choose Convert to Smart Object.

Creating Smart Objects

There are multiple ways to create a smart object: from layers within the current Photoshop drawing, from another Photoshop drawing, and even from Illustrator linework.

To create a smart object from layers or layer groups:

1. In Photoshop, select the layers to be used and right-click on them in the Layers palette. Select Convert to Smart Object.
2. The layers will collapse to a new Smart Object layer. The thumbnail will change to show that the layer has been converted. It is possible to convert one layer, multiple layers, or a layer group.

To create a smart object from an external raster or vector image:

1. In Photoshop, select **File > Place**. Browse to and select the file to be placed in the rendering.
2. Scale and position the artwork.
3. Press Enter or double-click on the artwork. A new Smart Object layer will be created.

Figure 22.2. The layer is converted to a smart object.

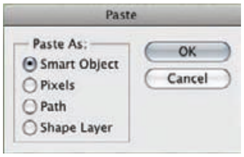


Figure 22.3. Paste the artwork as a smart object.

To create a smart object by cutting and pasting vector artwork:

1. In Illustrator, select the vector linework to be brought into Photoshop. Copy the artwork using Ctrl+C or select **Edit > Copy** and then switch to Photoshop.
2. In Photoshop, press Ctrl+V or select **Edit > Paste** to insert the artwork into the rendering. The Paste dialog box will appear. Under Paste As, select Smart Object and click OK.
3. Scale the artwork and press Enter, or double-click the artwork to create the new smart object.

All of these methods create smart objects in Photoshop. Because a smart object typically can be duplicated, it is important to give the layer a name and, in many cases, place it in a layer group. The smart object is artwork that is embedded within the Photoshop file. This creates a reference file, and each copy becomes an instance of the reference or master smart object.

Duplicating and Editing Smart Objects

The Smart Object layer cannot be altered directly in Photoshop other than through transforms such as Move, Scale, and Rotate. The embedded smart object file needs to be edited. To do that, follow these steps:

1. Select the Smart Object layer and select the Move tool. Alt+click and drag on the canvas to create a copy of the smart object. Move, scale, or rotate the smart objects on the canvas.

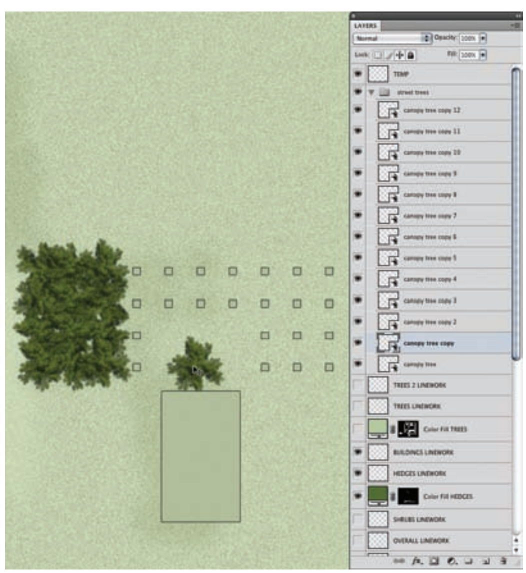


Figure 22.4. The smart objects have been copied in location and transformed with different rotations.

2. Double-click the Layer thumbnail for one of the smart objects. A dialog box will appear warning that after performing edits it requires saving the file and closing it to apply the edits. Click OK. The file will open in a new Photoshop document.
3. The document will be in the format of the original file, or if the smart object was created from layers, the file will be a PSB file (.psb). If the original document was Illustrator linework, the smart object will be opened in Illustrator rather than Photoshop.

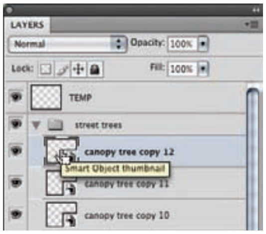


Figure 22.5. To edit the smart object, double-click the Layer thumbnail.

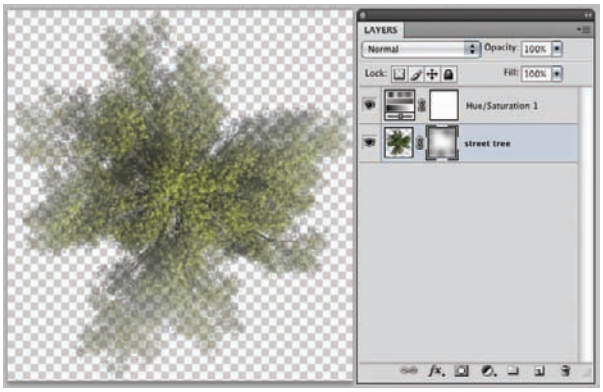


Figure 22.6. The smart object opens as a new file that can be edited. The smart object has been adjusted, and a layer mask has been added to create transparency on the edges.

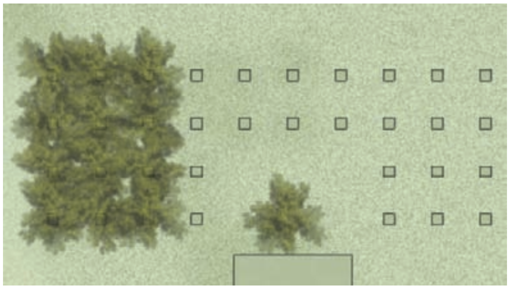


Figure 22.7. The edits are propagated across all smart objects within the Photoshop file.

4. Editing is now possible. New layers can be added, content can be adjusted, and portions of the image can be erased. Almost any edit can be performed in this file.
5. After the edits are complete, save and close the file. All of the smart objects copied from this smart object will be updated with the edits. However, the transforms made on the smart objects (such as position, scale, and rotation) are still in place. If it adjustments were made to the sizes of all of the smart objects, the contents of the smart object file would need to be edited.

Figure 22.8. Several options for working with smart objects are available by right-clicking on the smart object in the Layer palette.

Managing Smart Objects

After smart objects are created, they can be stored in a library of symbols so they can be used over and over again in renderings. The smart objects are saved as external files that can be used to create new smart objects. Some options for working with smart objects include:

- Right-click on the Smart Object layer. There are several options for smart objects: the first is New Smart Object from Copy. This option will create a new smart object that is not referenced back to the other instances. This allows a smart object to create a new series of instances that when updated won't affect the instance from

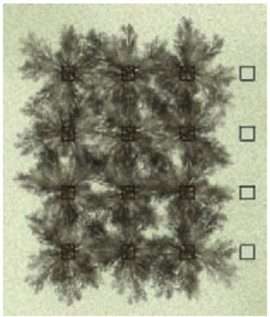


Figure 22.9. One smart object can be replaced with another. In this example, a winter tree symbol replaced the summer tree symbol

which it was copied. This is a good way to use an existing smart object to make something completely new.

- The layer can be rasterized by selecting rasterize from this menu. This will turn the smart object back into a pixel layer. The smart object will be deleted.
- The Edit Contents option allows the contents of the smart object to be edited. This option is the same as double-clicking the Smart Object thumbnail.
- The Export Contents option allows the smart object to be saved as an external PSB file so it can be used in future renderings.
- The Replace Contents option will take an external file and replace the contents of the smart objects. It is possible to switch the objects completely in order swap one symbol for another symbol. The two files, the one being replaced and the one being inserted, should be the same size in pixels. This will avoid scaling issues that might occur otherwise.

Smart Filters

Smart filters are extensions of smart objects that are available in the latest versions of Photoshop. They provide a method to apply filters in a *nondestructive* manner, so that edits can be applied without losing information. To apply a smart filter to a layer:

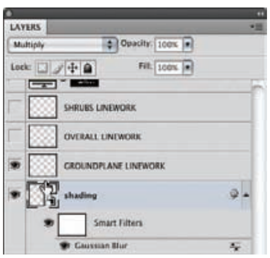


Figure 22.10. A smart filter is applied to a layer. Double-click the smart filter to edit its properties.

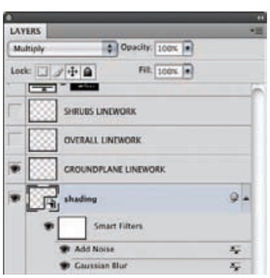


Figure 22.11. When multiple smart filters are applied to a layer, the order can be changed and the smart filter can be edited independently.

1. Select the layer to which the smart filter will be applied. Select **Filter > Convert for Smart Filters**. This will essentially turn the layer into a smart object. If the layer is already a smart object, it is not necessary to use Convert for Smart Filters.
2. It is now possible to apply a filter to the layer from the Filter menu. Try **Filter > Blur > Gaussian Blur**. Adjust the settings to create an appropriate blur, and click OK.
3. Two areas are added to the Layer palette—one for the smart filter and a second for the filter that was applied. To change the settings for the filter, double-click on its space in the Layer palette. The filter's settings dialog box will open.
4. It is also possible to add multiple smart filters. Simply add the next desired filter and it will be added above the first filter. The interesting thing about this is that the order in which the filters are applied can be adjusted by moving the filters up and down in the stack. The results from adding a Blur filter *before* a Noise filter are not the same as those from adding a Blur filter *after* the Noise filter.

This provides a very powerful method for applying filters to a layer. The one drawback is that if the pixels are to be edited on the layer, the editing must be done within the smart object.

Chapter 23
Managing Large Photoshop Files

Architectural sheet sizes are typically very large; a 36″ × 48″ rendering at 120 ppi can easily become a 1.5GB file, as layers and symbols are created throughout the illustration. Understanding how to work with these large files in order to keep Photoshop running smoothly is important. The goal is to always maintain the highest quality image with maximum editability, while not slowing down the computer. The problem is that these goals completely counteract each other, making it a constant struggle to keep down file size.

A file consumes computer memory through either RAM or hard drive space. Hard drive space is typically cheap, and RAM is typically expensive; therefore, most computers have much less RAM (4–8 gigabytes) than hard drive space (100–1,000 gigabytes). When a Photoshop file is open, two file size numbers appear at the bottom left of the screen. The first number shows what size the file would be if the image were flattened to a single layer. The second number shows the actual size of the unflattened file. If a single, digital photo is opened with no layers, the two file sizes will be exactly the same. As layers, symbols, smart objects, and effects are added the file, the size on the right will continue to increase.

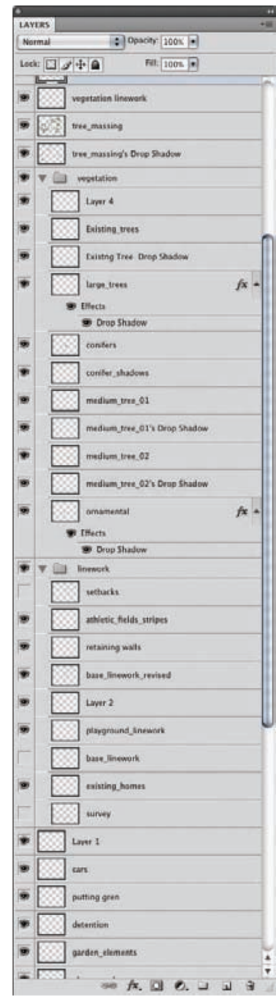


Figure 23.1. Each layer increases the memory the Photoshop file will need.

Flattening Layers

In most cases, layers are what quickly increase the file size. Imagine each layer as another file stacked on the original file. If there are more variations and more pixels, the larger the file will become. To cut down on the file size, it is possible to flatten the layer stack and combine layers.

1. Click on Layers in the menu bar. At the bottom of the layer menu, there are three options for flattening layers: Merge Layers, Merge Visible, and Flatten Image.
2. Merge Layers (Ctrl+E) will merge the currently actively layer with the layer below it. This is a quick way to combine two layers. Merge Layers will also merge multiple layers if they are all selected. To select several layers, hold down the Ctrl key and click on them, or click on one layer and hold down the Shift key to select a range of layers. With all the layers selected, merge the layers to create one layer from all of them.

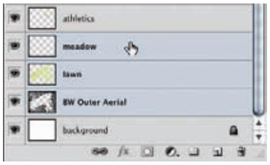


Figure 23.2. It is possible to merge one layer or several layers at once.

3. Merge Visible (Shift+Ctrl+E) will take all of the currently visible layers and create one new layer. This is a good way to flatten everything except for a few specific layers, such as text layers.
4. Flatten Image will flatten the entire image and discard any hidden layers. This is a quick way to get rid of everything and make one composite image.

It is important to remember that any time a layer is merged or artwork is flattened, the ability to isolate that information on its own layer is lost. This will make the image much smaller but will take away much of the flexibility that is necessary to make edits. Any flattening of the image should be taken with some reservation because it is not reversible.

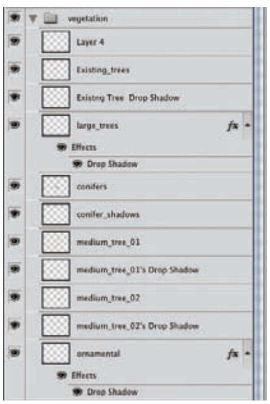


Figure 23.3. Layer groups can be used to organize many layers that will be duplicated to a new file.

Saving Layer Groups for Flattening

In the quest for smaller file sizes, it is possible to export portions of the document to other files to maintain editable portions of the document in case edits are needed. This is possible by grouping layers into layer groups and then duplicating the layers to new files.

1. Create a new layer group and name it something that describes the layers that are going to be flattened.
2. Move all of the layers into this group by dragging and dropping them. This can be done one layer at a time or several layers at a time.
3. Right-click on the layer and select Duplicate Group. A dialog box will appear. In the Destination section for the document, choose New. The name of the group should be the same as the name that was given earlier. This creates a new document with the layer group in it. Save this document for later use.

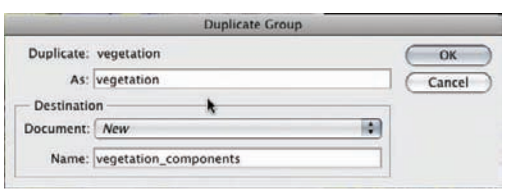


Figure 23.4. Right-clicking on a layer group and selecting Duplicate Group will bring up the Duplicate Group dialog box. The group can be duplicated to another file or a new file

4. Go back to the rendering and select the layer group. Merge the group (Ctrl+E). This will make a new layer from the layer group.

Figure 23.5. The layer group can be merged to create a new single layer.

5. If the layers that were flattened in the group need to be edited later, simply open the document with the layers and reverse the duplication process. Select the group, right-click, and choose Duplicate in the Layer palette. The destination should be the rendering instead of a new image. All the layers will be fully editable.

Printing Issues

Another issue that occurs with large files is failure to print: the printer runs out of memory while printing or otherwise crashes. Prints should be made from flattened versions in most cases. There is no benefit in printing from a 1.5GB Photoshop file with all of its layers intact. If the image is to be printed on a typical inkjet plotter, the image can be converted to a JPEG file (.jpg) to further reduce the file size. Some color quality may be reduced, but overall most renderings won't have any significant loss in color quality and, most importantly, the image will be printed. Most architectural renderings have a limited color palette and, therefore, suffer less when the image is compressed to a format such as JPEG.

Chapter 24
Creating a Section Elevation

Three main types of drawings are used to represent the cross-sectional space of a design: sections, elevations, and the most commonly used, a hybrid of the two called a section elevation. *Sections* are critical to the representation of a design idea. In a true section, only the information along a section line is represented. Most sectional work is used to represent spatial relationships between the landscape, buildings, and the human scale. These drawings help to relate the scale of a design alternative.

Elevations show an orthographic view of the design from one side. These drawings are similar to perspectives, except they show the information without many of the depth cues used in perspectives. *Section elevations* are a combination of the two techniques and are the most frequently used type of cross-section drawing in site design projects.

Methods

Rendering a section elevation is similar to rendering a plan. The linework for a section is drawn in AutoCAD and exported as a PDF. The PDF is brought into Photoshop, and base colors are applied in a similar fashion to plan renderings. One technique that is common in a section elevation but rarely used in a plan rendering is to use the linework to cut away portions of an image. Consider the following example of the anatomy of a section elevation drawing in Photoshop:

1. The linework from AutoCAD is exported as a PDF and brought into Photoshop.

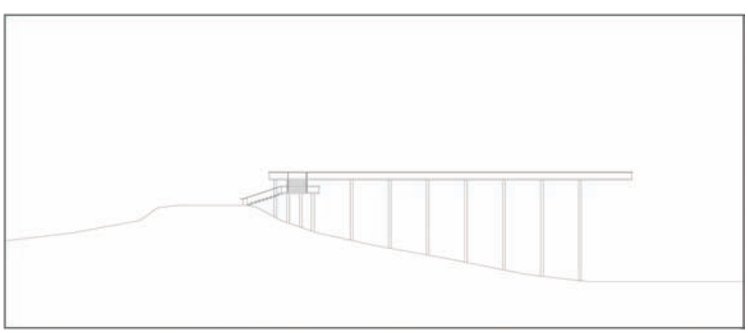


Figure 24.1. The linework from AutoCAD is exported as a PDF and brought into Photoshop.

2. Place an image of background trees on a new layer in the section. Adjust the opacity of the layer to make the background images lighter. Make a selection using the existing linework of all areas that are in front of the background. Erase parts of the image where the linework is in front of the background trees.

Figure 24.2. The existing linework is used to make a selection, and the background trees are erased.

3. Add entourage trees in front of the background. Each tree should be placed on a separate layer. Each tree behind the linework can be erased using the same selection used to erase the background.

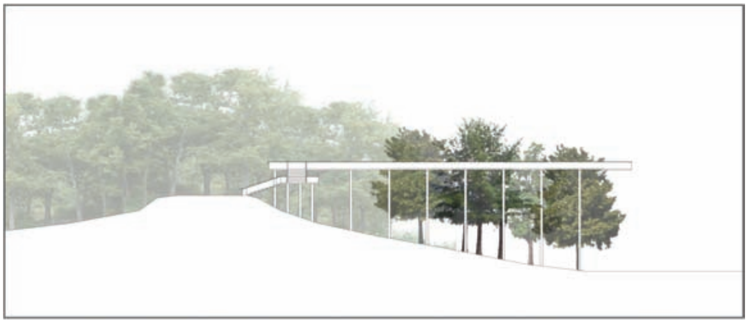


Figure 24.3. Foreground trees are added. Cut away parts of the trees that are behind the linework.

4. Add the remainder of the trees in the mid-ground layer; add the grasses or groundcovers.

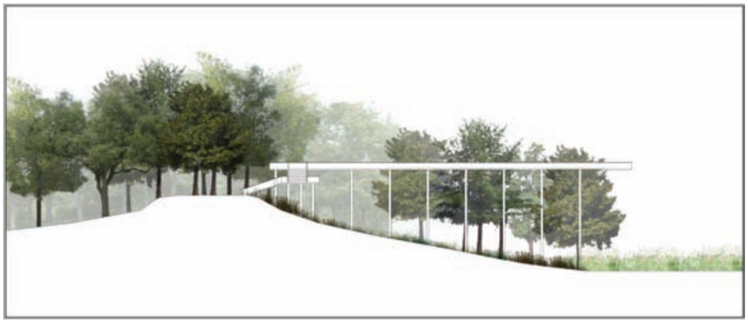


Figure 24.4. Continue to add trees and ground cover plants.

5. Color the linework using a Solid Color adjustment layer, similarly to how the plan rendering is colored.

Figure 24.5. Fill the linework using a Solid Color adjustment layer.

6. Add people to the image and place them in places that are key to the design. The use of people will draw attention to specific areas of the drawing.

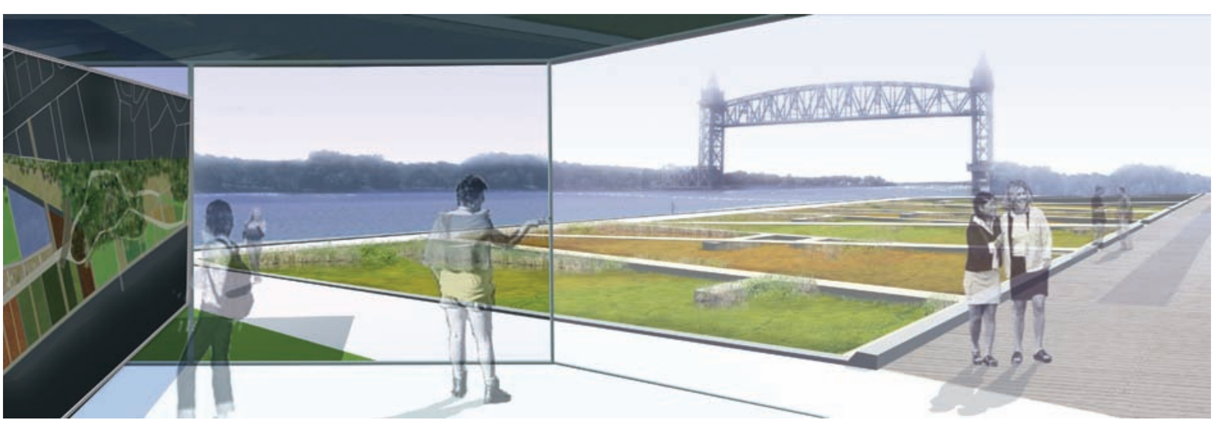
Figure 24.6. Add people to the composition.

7. Add the front layer of trees. This creates depth in the drawing by layering the space from front to back.

Figure 24.7. The final composition.

Part 5
Perspectives

Couturie Forest, City Park, New Orleans, LA; pathway through forest perspective.



Bridge Park Competition, Buzzard's Bay, MA; overlooking levee perspective.

Soundview Park, Bronx, NY; aerial perspective.

Bayou Bienvenue, New Orleans, LA; terrace perspective.

Viet Village Urban Farm, New Orleans, LA; market perspective.

Growing Home, New Orleans, LA; aerial perspective.

Growing Home, New Orleans, LA; aerial perspective.

Growing Home, New Orleans, LA; aerial perspective.

Chapter 25
Perspective Illustration

Perspective illustration is an essential component of design communication that focuses on representing the experiential qualities of pictorial space. Perspective illustrations have a broad range of uses in multiple stages of the design process. Regardless of the medium, it is important that designers develop efficient methods to create perspective illustrations. Digital media allows designers to combine a variety of information (CAD, 3D models, imagery, and hand-drawn sketches) to create perspective imagery. The versatility of digital media to combine multiple layers of information also creates the opportunity for perspective illustrations to evolve throughout a design process.

In order to create compelling perspective representations, it is important to understand the fundamentals required to create compelling hand-drawn or manual (analog) collage perspectives. This chapter introduces design students and designers to the basic ideas of *perspective composition, environment*, and *camera matching.* Because perspective illustration deserves a volume of its own, this chapter positions perspective illustrations in relation to the other design drawings: diagram, plan, and section/elevation. Understand the relationship between these drawing types is important in order to know when to use them effectively in the design process or for client presentations.

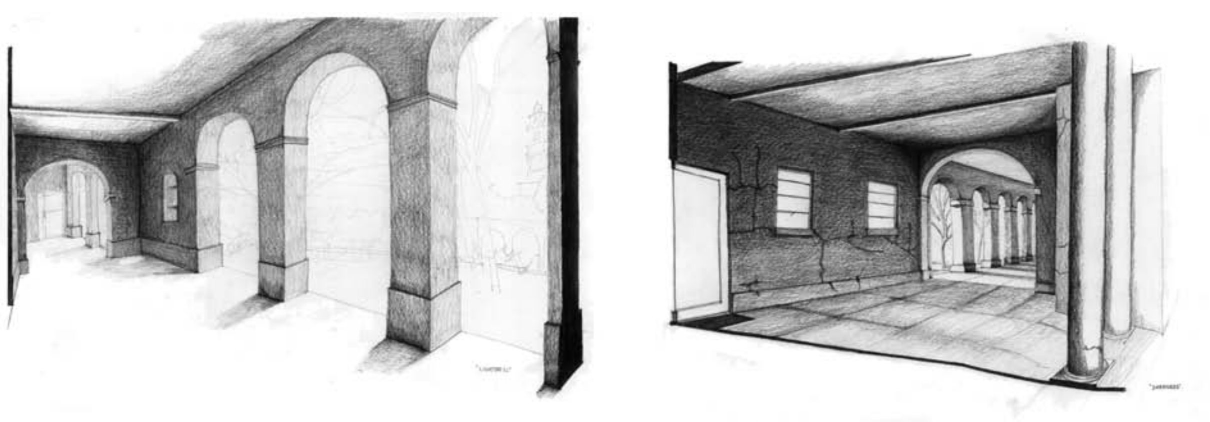


Figure 25.1. Graphite, hand-rendered perspective illustration.

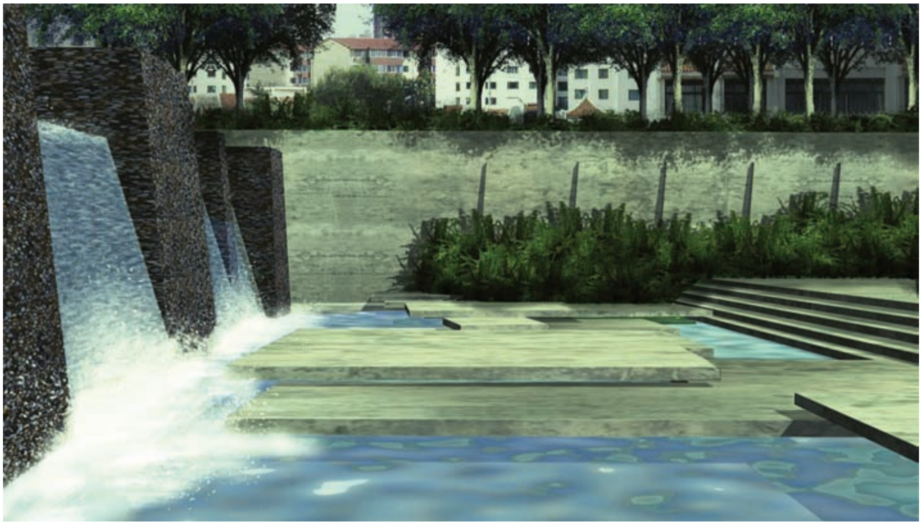


Figure 25.2. 3ds Max and Photoshop, perspective illustration.

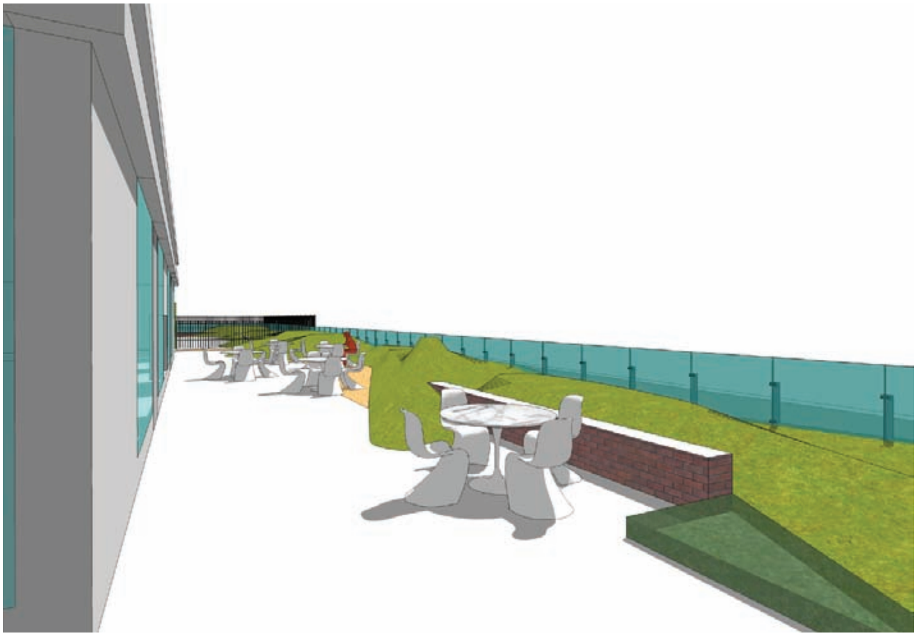


Figure 25.3. SketchUp, perspective illustration.

Perspective Illustrations, Digital Sketches, and Design Communication

In early stages of the design process, perspective allows designers to explore simple spatial relationships and experiences. Without the aid of a measured orthographic drawing, perspectives can be used to depict movement and experience—giving life to ambiguous spaces. This can be accomplished in multiple methods, using hand-drawn sketches or Google SketchUp for base models that can be further articulated in Photoshop.

Figure 25.4. SketchUp, perspective illustration.

During the early stages of the design process, many designers develop preliminary models (digital or analog) without spending any time rendering. This lack of attention results in form that is expressed strictly through surface and light quality, which makes camera placement and view composition crucial. Many designers underestimate the power of these early models and, therefore, put little thought into how the camera portrays virtual space. Perspective renderings allow designers to express specific views, therefore creating very intentional relationships in the landscape.

Rendering style also plays a significant role in the portrayal of information in preliminary design work. If the illustrations are very refined, clients often view the imagery as final design solutions rather than preliminary ideas. To avoid such misunderstandings, it is often important to allow the illustrations to have a looser quality, which can come from breaking the pictorial frame, line art renderings, hybrid sketching, and photo montage illustrations. *Breaking the pictorial frame* creates a looser edge for the image, floating the work on the page rather than constricting it to a defined frame. Many renderers—including Google SketchUp, 3ds Max, and Maya—offer the ability to create line art renderings. Line art renderers can create a range of options that imitate hand-drawn sketches or create cell-shaded work for comic books or animations.

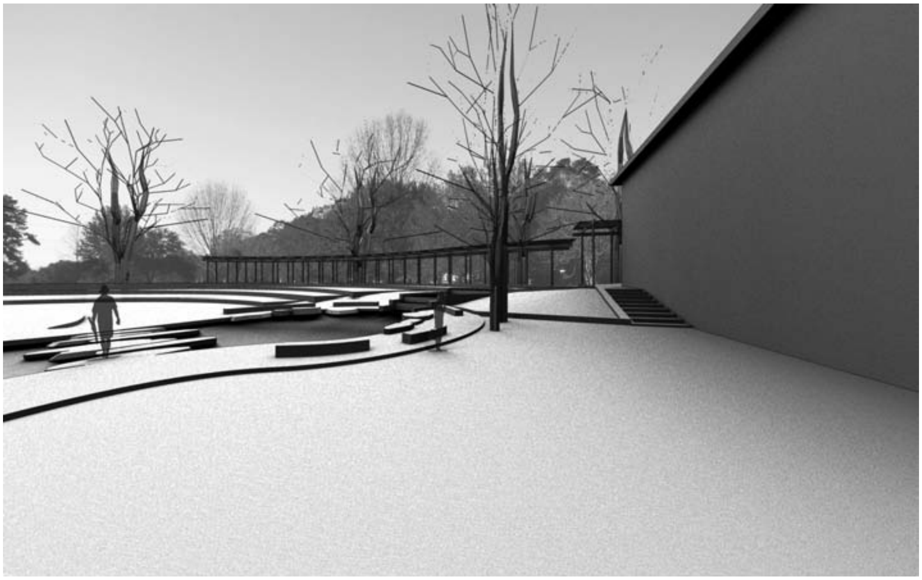


Figure 25.5. 3ds Max, perspective illustration.

Figure 25.6. 3ds Max and Photoshop, preliminary perspective illustration.

Because many designers feel perspective illustration requires a vast amount of time, it is often relegated to the final stages of the design process. At later stages of the design process, the concept is often further developed and, therefore, the time spent creating and rendering perspective illustrations is invested only once. This investment should last *throughout* the design process; therefore, once a perspective view has been established within the design process, it is possible to continue to revise and evolve the drawing. The illustration can be used to test-out multiple design concepts, materials, and/or programs by compositing layers that are organized in the foreground,

middleground, and background. This allows the illustration to evolve throughout the process until it is ready to be used for client or marketing presentations.

Figure 25.7. Photoshop, perspective illustration.

Figure 25.8. 3ds Max and Photoshop, perspective illustration.

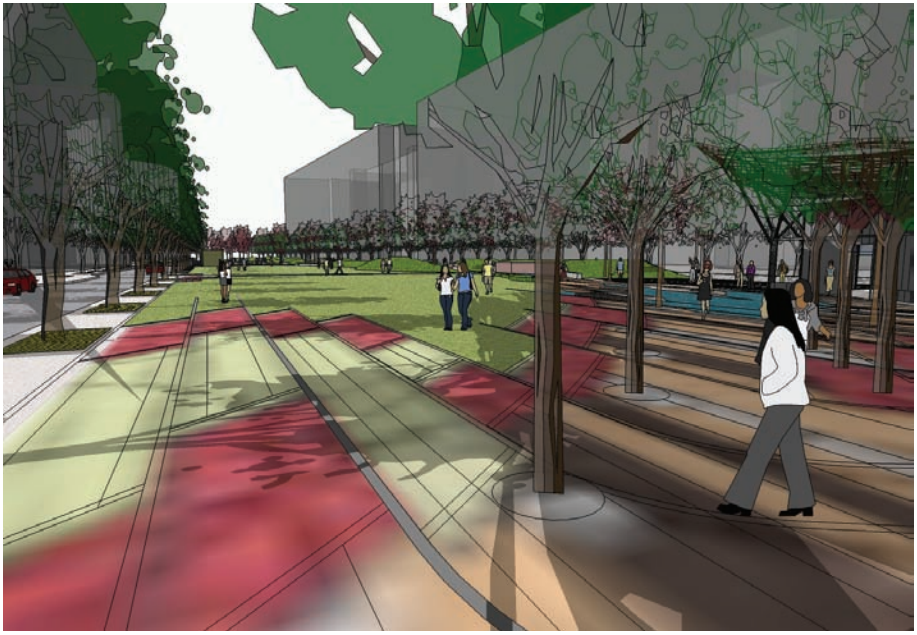


Figure 25.9. SketchUp and Photoshop, perspective illustration.

Figure 25.10. Photoshop, perspective Illustration.

Chapter 26
Creating a Base for a Perspective Drawing

Traditional perspective drawings have relied on the *perspective chart* or constructed perspectives to create compelling and convincing illustrations. This aid creates an underlying framework that facilitates accurate, scaled perspective drawings from measured plans. Image-editing software such as Photoshop allows for the incorporation of perspective grids using layers that contain an image of the perspective grid or an existing site photo. This allows the designer to develop an illustration using traditional drawing or collage methods within Photoshop.

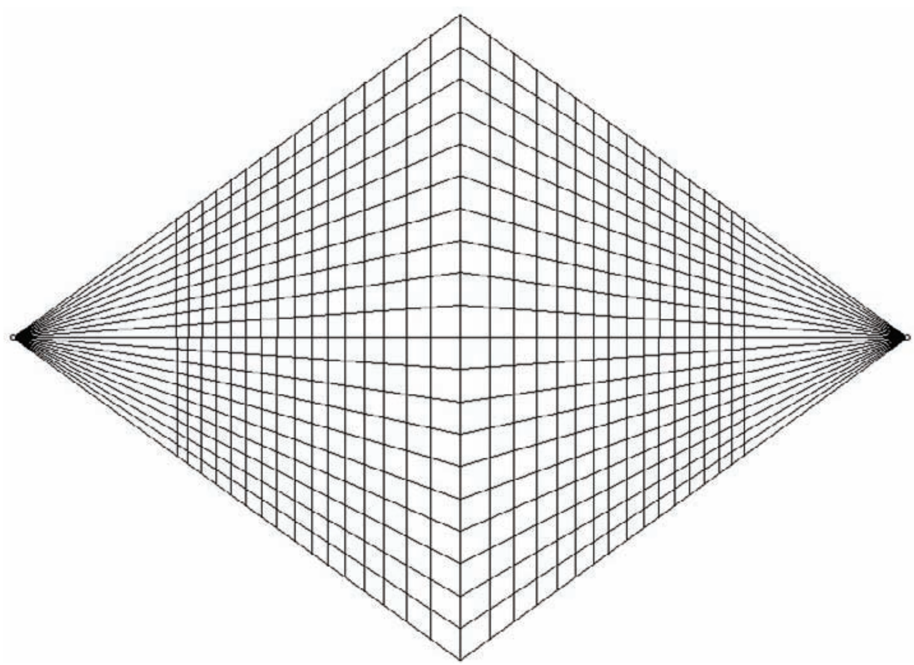


Figure 26.1. Perspective grid/chart, analog and digital.

Three-dimensional modeling software (such as Google SketchUp, Autodesk 3ds Max Design, Newtek Lightwave, Softimage XSI, and/or Autodesk Maya) allows designers to develop digital models of their design work. As the design model develops, virtual cameras can be used within the model to frame and compose views of a work in progress or a finished model. By combining image-editing software and three-dimensional modeling and rendering, a flexible, customized method can be developed to create accurate perspective illustrations. This combination ideally occurs with image-editing software that supports layering and transparency, and modeling software that allows images to be rendered or exported with embedded alpha channel information for attributes such as transparency, z-depth, materials, and shadows.

Figure 26.2. Composite Layer Extraction.

The process of combining layers of three-dimensional renderings, film, and illustrations is defined as *compositing.* Most people are familiar with the use of *green* or *blue screen filming* that allows foreground elements/actors to be separated from the background and new background plates to be inserted. Architects and landscape architects can also take advantage of compositing by using three-dimensional models as a base for more complex illustrations.

Figure 26.3. A green screen is used to film and composite figures in the environment.

Composition

When a base is being created for any perspective image, it is important to first carefully consider the composition that is being created. *Composition* refers to the arrangement of elements within the camera's frame. For visual artists, the *rule of thirds* is a common method that attempts to keep the subject and horizon from bisecting the image. The "rule of thirds" refers to the process of splitting the image plane vertically in the thirds and placing the focus of the image on one of the vertical splits. In most three-dimensional modeling applications, a virtual camera is used to frame the view or create the composition. This requires careful consideration of camera position and field of view.

Figure 26.4. Rule of Thirds grid.

Virtual Cameras

The position of the camera is typically controlled in two ways. The first is directly in the viewport using controls that orbit, roll, pan, and dolly the camera. This method requires viewing the scene directly through the camera and interactively adjusting the view. This allows for instant one-to-one feedback and can be a quick way to position a view. All three-dimensional modeling software allows the user to manipulate their view in this manner; but while intuitive, it doesn't allow the precision that is sometimes necessary when creating compositions. Google SketchUp provides a slightly different mechanism to position your view that allows the user to adjust the point of view by controlling the camera direction as though it is the viewer's eyes.

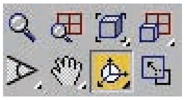


Figure 26.5. Three-dimensional camera controls.

The second method for camera control is through the positioning of the *camera body* and the *camera target*. The camera body and target are points in space that typically define the start and end vectors of a view. Each point, the body and the target, can be transformed independently with an interactive *gizmo* or by specifying coordinates within the Cartesian grid.

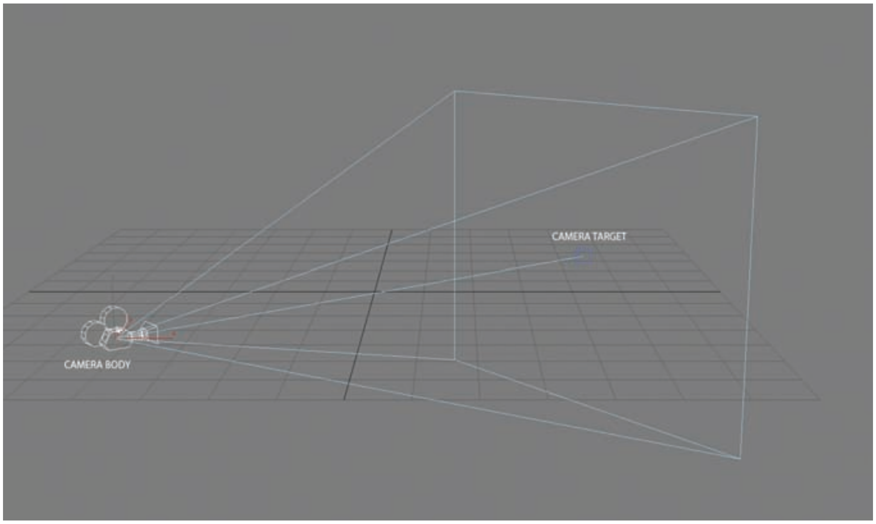


Figure 26.6. Camera body and target with transforms.

The height of the camera is an important consideration that allows the viewer to surmise specific experiential qualities of the space. For example, a camera that is placed at 3.5′ would portray a child's view, where a height of 5′–6′ would portray an adult. A worm's eye view of 1′ above the ground plane would abstract the image and dramatize the subject, and an aerial view of 30′–100′ would create a separation between the viewer and the site. Where the camera is placed within the site and the height of that location also defines the view—for example, a view at ground level along an interpretive trail has different qualities than a view from a lookout tower. Both views are from a human-scale perspective, but there are different landscape experiences in each view.

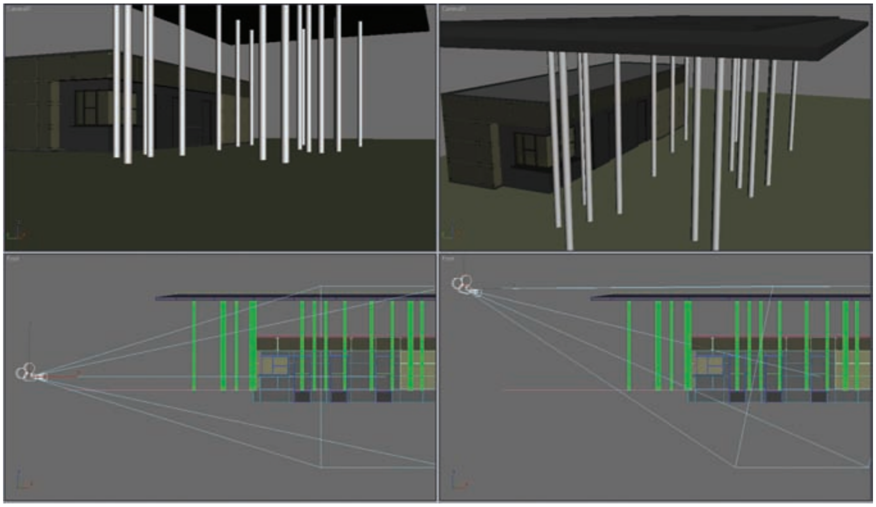


Figure 26.7. Camera height diagrams.

Figure 26.8. Example views.

How the frame is filled with elements in an illustration is also an important way to convey proposed or existing site experiences. Vegetation or overhead structures in the foreground that "cover" the viewer can provide a sense of refuge, a virtual vantage point from which to view the surroundings. Conversely, opening up the foreground allows the viewer's eye to travel to the edge and off the page, implying a site that is expansive and sprawling. The concepts of circulation, program, and occupation can also be expressed through the framing and viewpoint location.

Figure 26.9. Foreground structure/vegetation.

Figure 26.10. Expansive views.

Figure 26.11. Example of occupation.

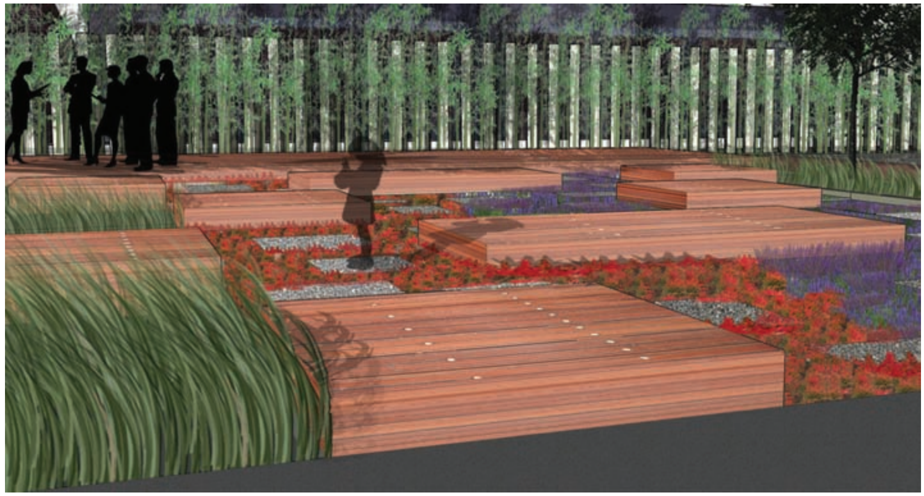


Figure 26.12. Example of program.

Figure 26.13. Example of circulation.

In conjunction with camera placement, it is also important to use field of view in an efficient manner. The *field of view* can be described as the angular extents of the observable world. Typically, the human eye has a field of view that is approximately 180 degrees; most illustrations are created in a range of 40–100 degrees (50mm–15mm camera lens). A wide-angle lens will distort geometries, exaggerating object forms that move between the foreground and background. The choice of lens is an important method that can create motion and drama in an illustration.

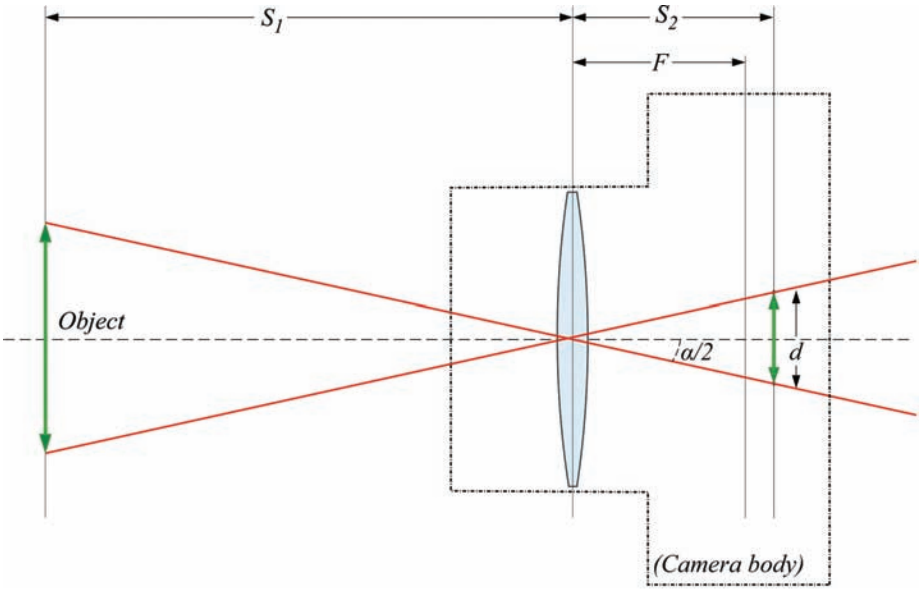


Figure 26.14. Field of view.

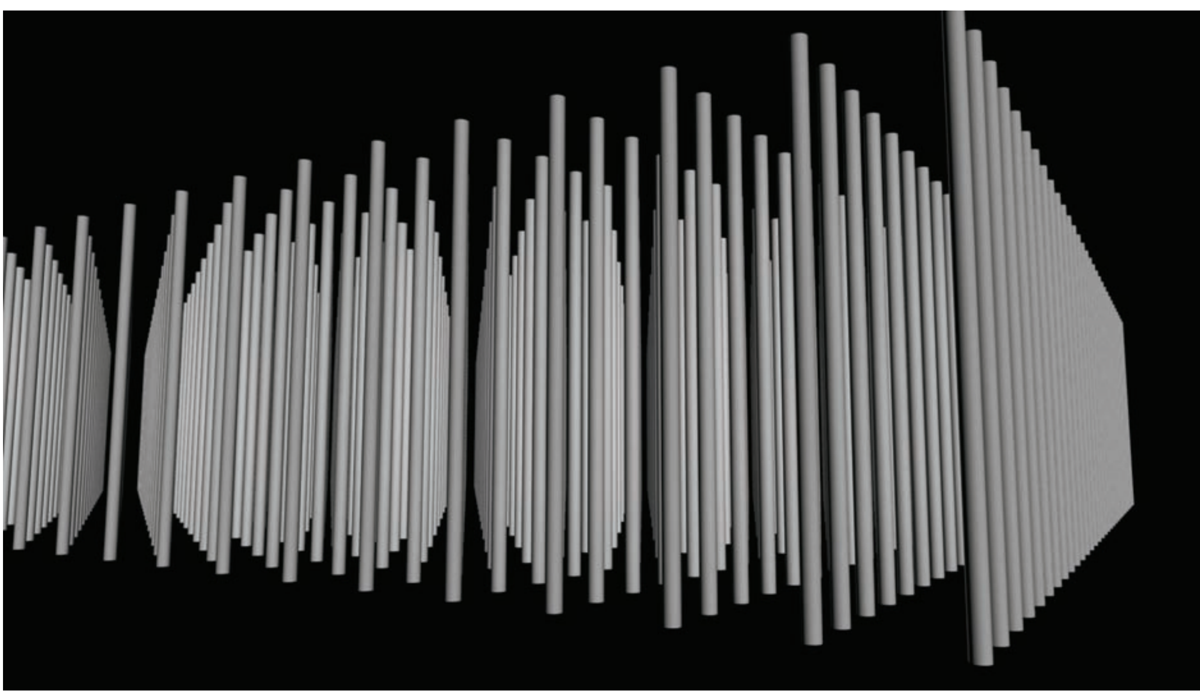


Figure 26.15. Lens distortion.

Exporting and Rendering

In order for a composition created with a camera in three-dimensional modeling software to be used, the view must be exported or rendered in a file format that can be used in image-editing software. Depending on the software, files can be created that are either raster- or vector-based. When raster files are created, the final illustration size will be limited by the pixel resolution of the exported imagery. Two things need to be considered when determining the export or rendering resolution: the final output or printed size of the illustration and the limitations of the hardware exporting the file. The topic of print output was discussed earlier in this text and can be reviewed on page 37.

The issues related to hardware limitations are stickier points and are often not defined by simple formulas. In simple terms, there is an exponential relationship between image pixel size and the memory that is required to render or export the image. The complexity of the three-dimensional scene—which is a product of geometry, materials, and effects—also contributes to the memory needs when rendering or exporting. If lack of memory (RAM) is an issue and resolution is not a negotiable factor, it may become necessary to export scene elements separately in order to overcome hardware limits. This often involves rendering the foreground, middleground, and background as separate layers to minimize the model complexity. It is also possible to render effect elements such as fog, lighting volumes, etc. as separate passes, which will also separate the complexities of that process and put less strain on the hardware. In order to render illustration components separately, most three-dimensional modeling software that *renders* an image allows the user to save image formats with alpha channels to define transparency or other attributes. The most common formats that support alpha channels are Targa, TIFF, and Photoshop files.

It is important to devote time to the composition of a perspective drawing. Many factors contribute to an interesting and meaningful perspective illustration, including composition and viewer location. When used properly, they are powerful tools to convey complex landscape images.

Chapter 27
Atmospheric Perspective

In landscape, the location of objects in space are perceived through the veil of atmospheric perspective. *Atmospheric perspective* refers to how an object's appearance is affected by layers of moisture and particulate matter in the air. As the distance between the object and the viewer increases, more layers of air affect the object's appearance. Generally, this manifests as haze, shifting the appearance of objects in the distance toward a bluish hue and less saturated colors.

Figure 27.1. Saturation and detail diminish with distance.

Traditionally, landscape representation, painting, and drawing have used basic techniques to simulate the effect of layers of air between the viewer and objects within the environment. The simplest means is the *desaturation* and gray-blue haze applied to objects that are farther away from the camera. Other methods involve rendering less detail and a using a variety of thinner, lighter linework in the distance.

All of these traditional techniques for creating depth in the landscape are essential when developing digital representations. Atmospheric perspective can be used in two-dimensional collages as well as full three-dimensional renderings in order to heighten perceived depth. When representing the landscape, atmospheric perspective is expressed in several ways but always with these basic characteristics.

Detail

Objects closer to the viewer will be rendered with more detail. As objects recede toward the horizon, they begin to lose their definition. This can be observed in the rendering of trees in the landscape, where trees close to the viewer appear completely detailed. As trees are rendered toward the horizon, they become less detailed until they finally blend into the hillsides in the distance.

Figure 27.2. Detail diminishes with distance.

Color

Color tends to shift from saturated in the foreground to less saturated near the horizon. This shift represents the scattering of light through the atmosphere, particularly water vapor and particulate matter. During daylight, color tends to shift toward blue due to shorter wavelengths of light within scattered skylight. At night, there is virtually no skylight; therefore, objects tend to shift toward a reddish hue.

Figure 27.3. Trees lose saturation as they get farther away from the viewer.

Contrast

The veil or haze of the atmosphere also affects an object's contrast; contrast decreases as elements recede from the viewer. Objects in the distance have smaller shifts in value, making them appear less detailed or less crisp than objects in the foreground. This effect can sometimes be confused as a lack of focus, but it is simply a side effect of low contrast. As long as it is subtle, a blurring effect can be used to heighten the lack of contrast.

Brightness

Brightness is the subtlest effect that helps to create atmospheric perspective. If all lighting conditions are equal, objects near the viewer are typically brighter than objects near the horizon. This can change though, based on the location of the viewer in relation to lighting quality within the landscape.

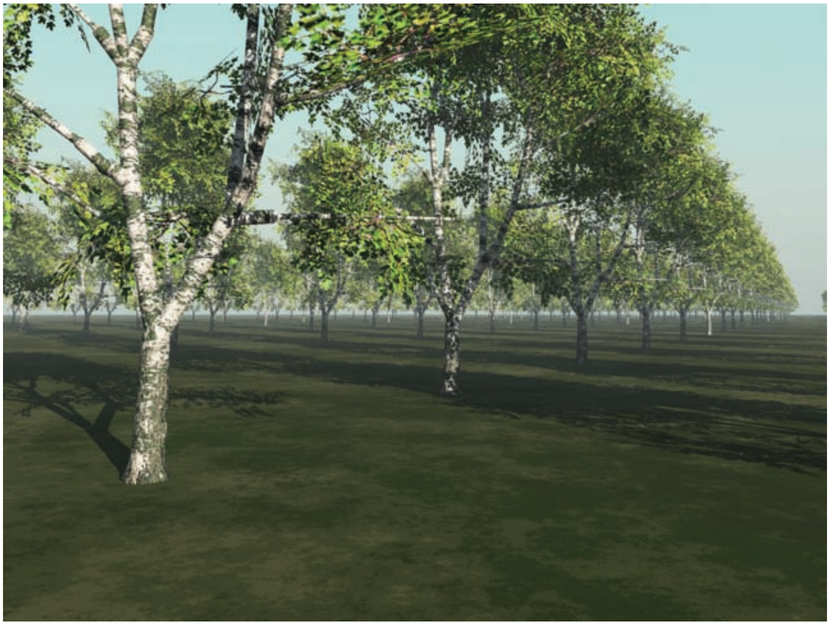


Figure 27.4. Contrast decreases as distance from the viewer increases.

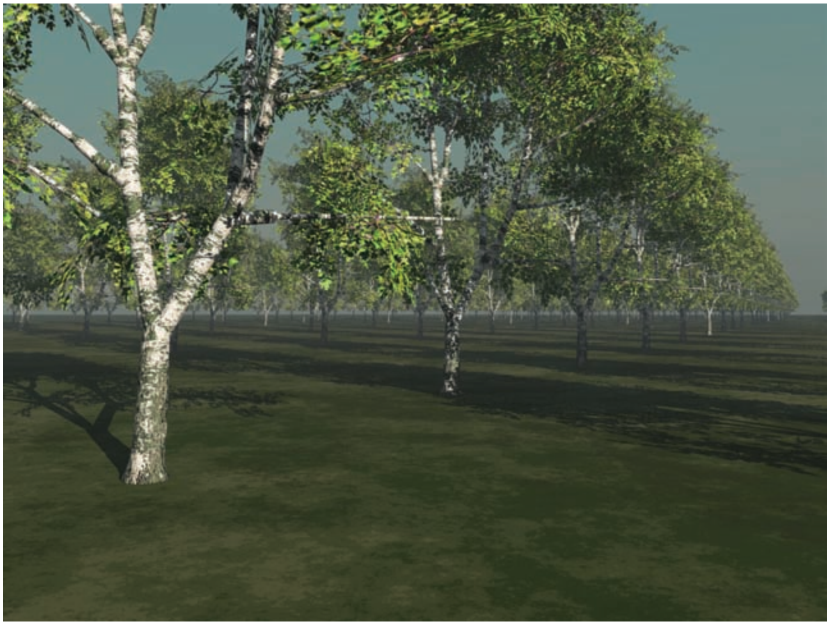


Figure 27.5. Lack of brightness is relative to distance from the viewer.

The tools used for creating atmospheric perspective come in two categories: two-dimensional layering (or compositing techniques) and three-dimensional, environmental techniques. Both types of techniques overlap one another and share the same basic assumptions discussed earlier.

(2D) Photoshop Adjustment Layers, Opacity, and Screening

In most cases, atmospheric perspective is accomplished in an image-editing program such as Photoshop, using a large array of tools. In most cases, this is achieved using adjustment layers, layer opacity, and screening.

Photoshop provides advanced two-dimensional tools to create the illusion of atmospheric perspective. Adjustment layers provide a robust method for applying brightness/contrast and hue/saturation adjustments directly within the layer stack. You can experiment with this method by creating three shape layers consisting of consecutively smaller rectangles falling back in space.

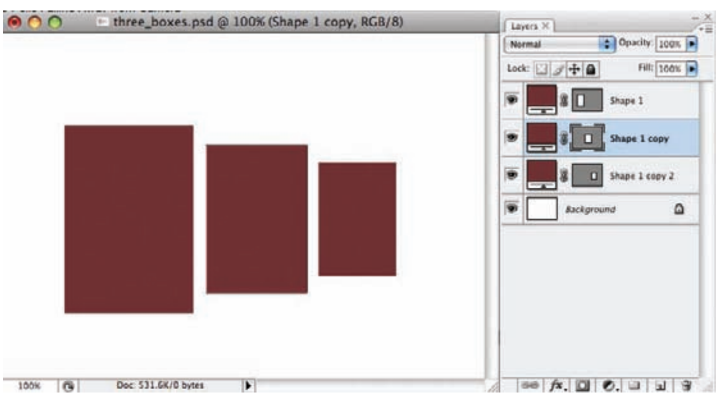


Figure 27.6. Rectangle shape layers in Photoshop.

1. Select the middle layer (the largest rectangle) and apply a hue/saturation adjustment layer.
2. Decrease the saturation and push the hue toward blue. Then click OK. This creates an adjustment layer below the top layer that applies to all of the layers below. Now the two smaller rectangles are adjusted similarly: the color is less saturated and the color is bluer.
3. Copy the same adjustment layer by selecting the layer and Alt+dragging the layer above the bottom layer—this doubles the effect of the adjustment layers.

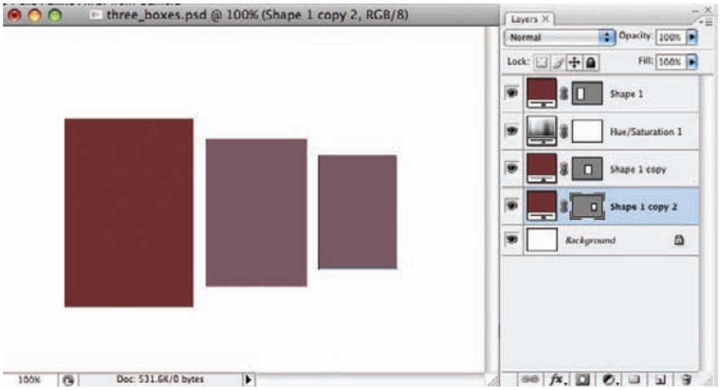


Figure 27.7. Apply an adjustment layer.

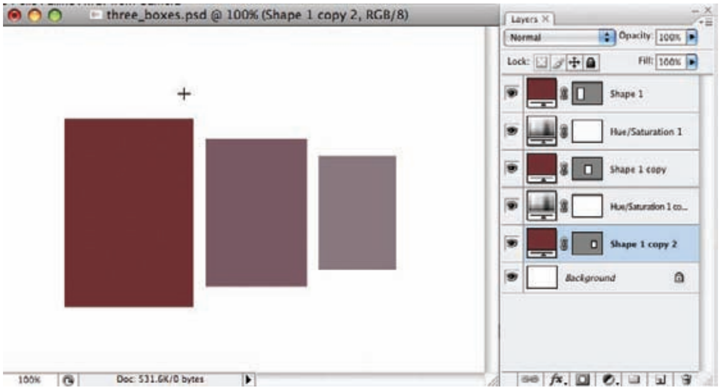


Figure 27.8. Copy the adjustment layer.

The rectangle exercise gives us a very simple scenario to illustrate the application of adjustment layers. In more complicated renderings, a variety of techniques are employed to create this same illusion.

Layer opacity is another method to create the effect of atmospheric perspective. This method works well when placing entourage elements within a perspective image. Atmospheric perspective works in conjunction with all other aspects of creating perspective renderings and, therefore, must be based on a well-constructed and believable image. When placing entourage elements, such as scale figures, within a perspective rendering, it is essential that the head of each figure is near the horizon line if the view is at eye level and that they are properly adjusted to fit the overall color scheme.

A typical process for adding scale figures is shown in the following figures. It is important to note that each figure is quickly placed within the perspective rendering and transformed to the correct size. A guide is commonly set to determine the horizon line for the tops of the scale figures heads. Scale figures are then arranged in the layer

stack with foreground figures near the top and background figures near the bottom. Opacities can then be adjusted. Even foreground figures should have some transparency, typically starting at 90 percent opacity and working down to 25 percent opacity for figures in the background.

Figure 27.9. Placing and transforming scale figures.

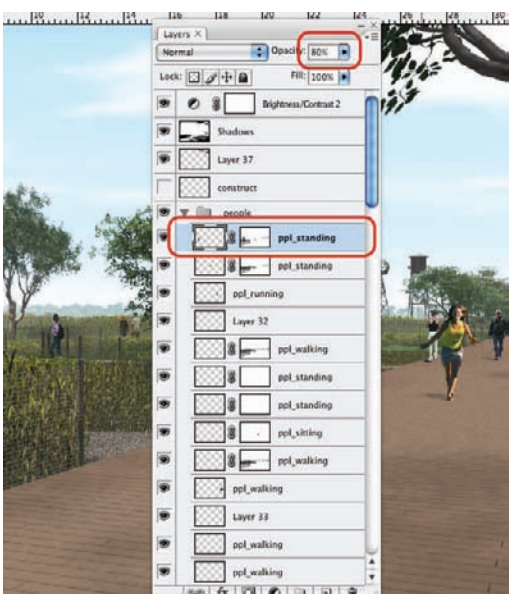


Figure 27.10. Adjusting the opacity of scale figures.

In conjunction with adjusting the opacity, it is also possible to add hue/saturation adjustments similar to how they were added in the rectangle exercise earlier. *Layer clipping* uses the pixels of one layer to constrain the pixels or effect of another layer. Because the adjustment layer should affect only the entourage element, layer clipping is used. To apply layer clipping in Photoshop:

1. Hold the Alt, place the cursor between the layers, and then click between the layers.
2. The top layer will be clipped by the pixels on the layer below it, constraining the effect.

Other methods are possible to create similar effects and can be used with similar outcomes. In Photoshop, the Color Overlay layer effect can be utilized to give a layer a bluish hue; this works method particularly well when combined with layer opacity.

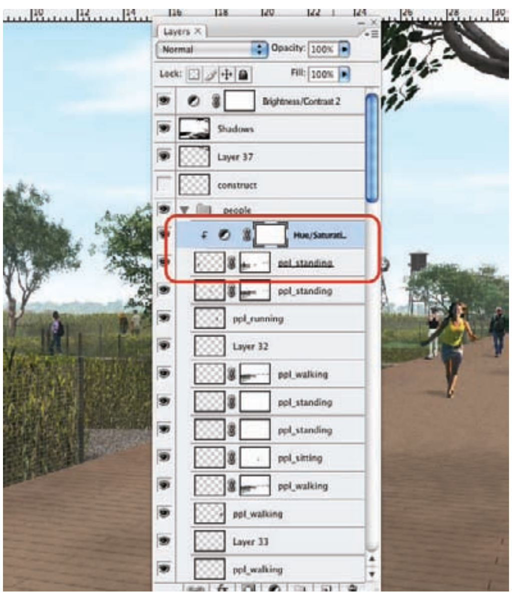


Figure 27.11. Layer clipping and adjustment layers.

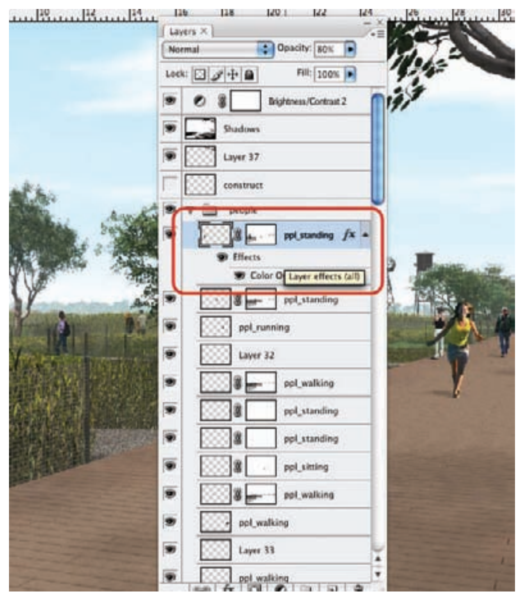


Figure 27.12. Layer effects.

On larger areas, such as the ground plane, it is often necessary to apply an adjustment layer differently across the entire layer. If elements on the layer move through three-dimensional space from the foreground to the background, it is necessary to specify how the adjustment layer affects areas differently than other areas. Typically, this can be specified within the adjustment layer mask using a gradient that goes from black to white (no adjustment in the foreground to full adjustment in the background). This allows the adjustment effect to be applied smoothly across the gradient, creating the illusion of depth.

Some image-editing programs, such as GIMP, do not provide the ability to apply adjustments or layer effects. Therefore, it is necessary to use alternative methods. A common method is to organize your layers from foreground to background within the layer hierarchy. It is then possible to create layers in the hierarchy that are used as haze—this can simply be a layer filled with a light bluish gray. Using layer opacity, it is then possible to adjust the opacity of the haze layer to get the desired effect. Copying the layer down in the layer hierarchy allows the layers to build on one another, making the foreground elements brightest and the background elements obscured.

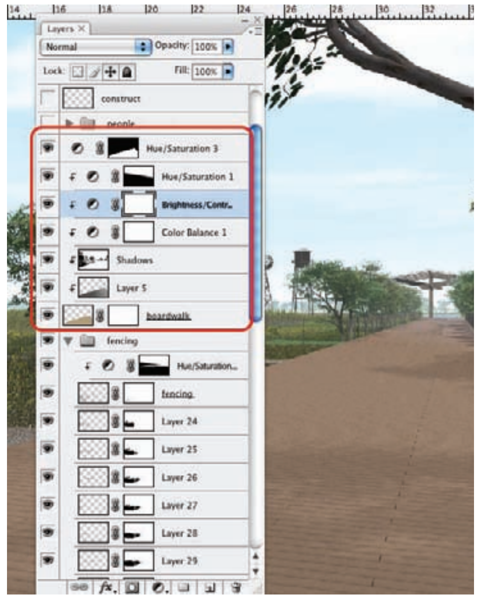


Figure 27.13. The Adjustment Layer gradient mask.

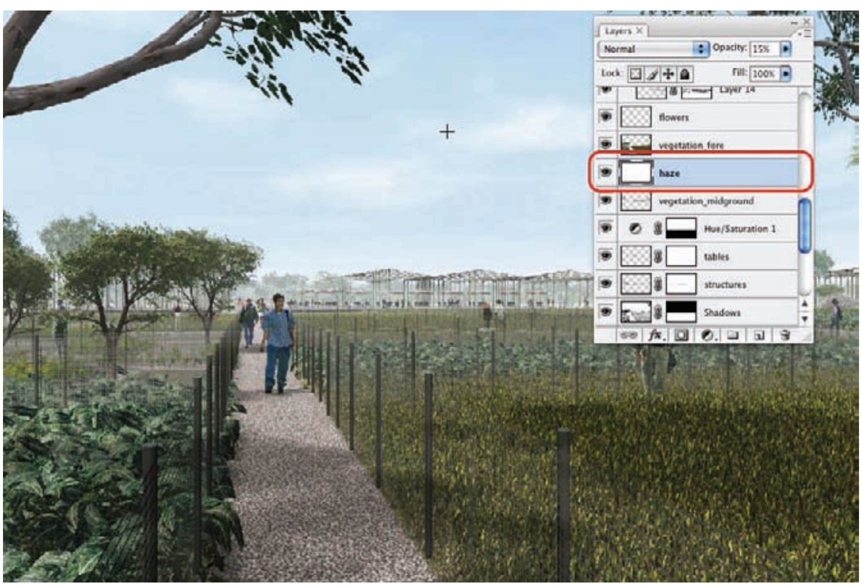


Figure 27.14. Haze layers.

(2D/3D) Z-Depth

Most 3D modeling and animation software, such as 3ds Max and Maya, provide options to generate a z-depth channel. The *z-depth channel* uses shades of gray to designate how far objects are from the camera. In most cases, the z-depth channel generates white for elements closer to the viewer and black for elements farther from the viewer.

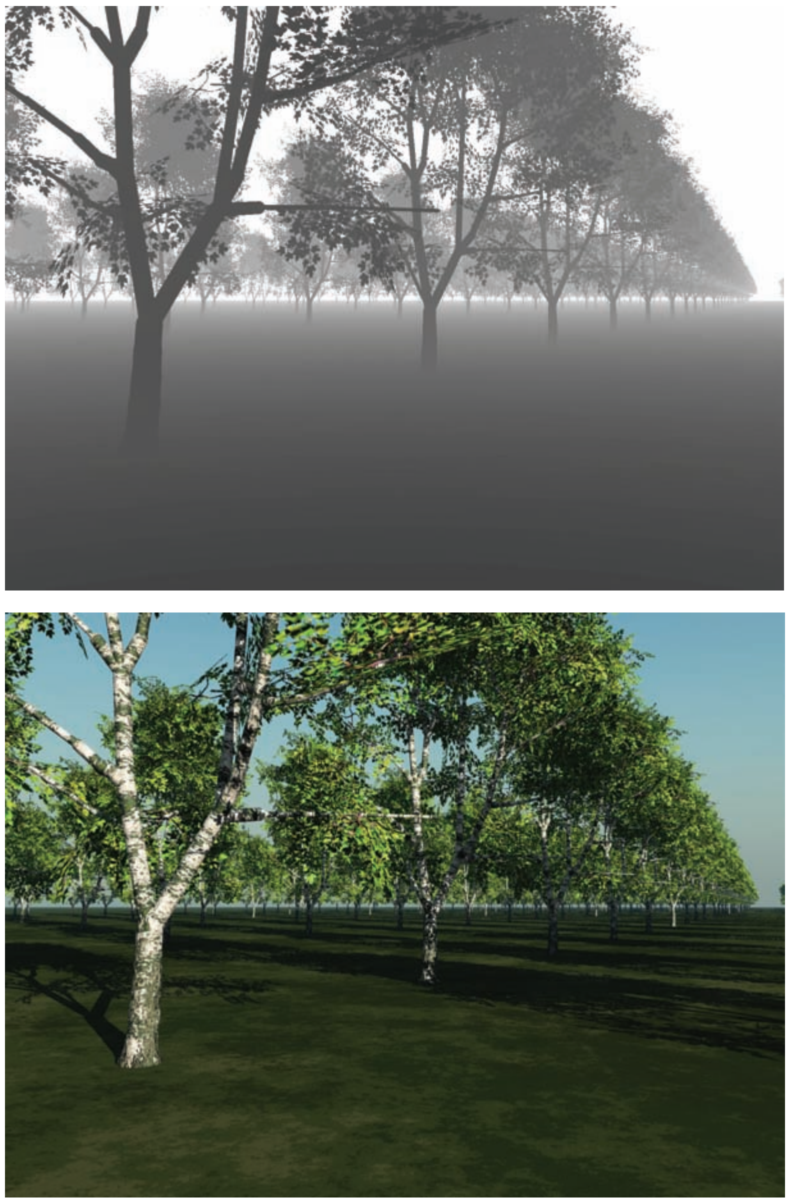


Figure 27.15. Typical z-depth.

A typical method to generate a z-depth buffer involves generating render elements or a g-buffer. Using Autodesk Maya, you must first open the **Render Settings > Render Able Camera** and turn on the depth channel (z-depth). You then must navigate to the camera's attributes using the **Attribute Editor > Output Settings,** where you can enable the z-depth type. Maya allows you to embed a z-depth channel into an .iff or .rla file, or you can specify another file type, such as .tif; and the z-depth information will be rendered to a separate RGBA file.

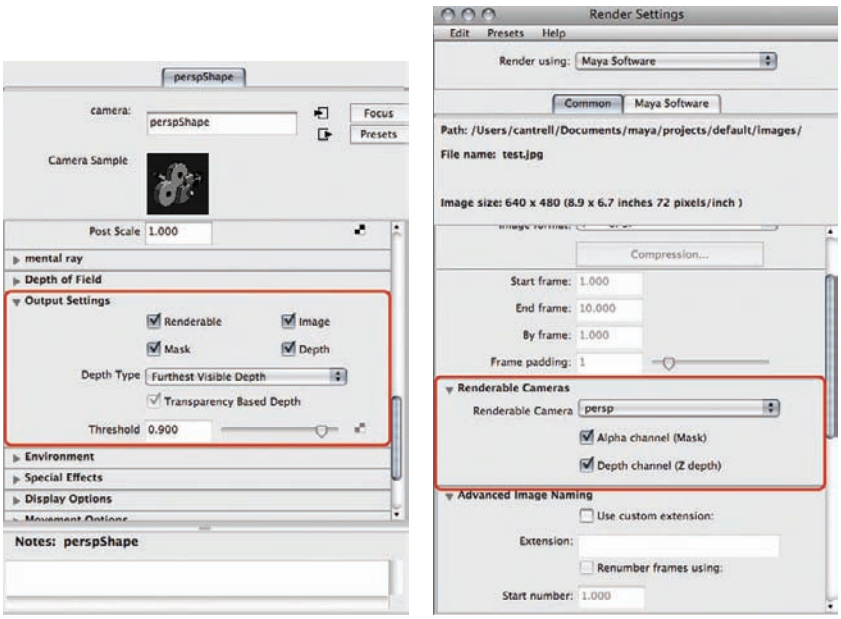


Figure 27.16. Maya z-depth settings.

Once a z-depth channel has been rendered, it is possible to use the information in any image-editing or compositing program to simulate depth. Because the z-depth is created using shades of gray, it can be used to generate a mask to control the effect of an adjustment layer. Depending on how the z-depth layer was generated, it may be necessary to invert the values to make foreground values black and background values white. This will apply the adjustment layer in a manner similar to the gradient used earlier. As you can see, this is a much more refined method of applying atmospheric perspective, but it requires that the majority of the image be created within a 3D modeling package.

Figure 27.17. Full landscape z-depth.

(3D) Atmosphere/Environment

Haze or atmosphere can also be created directly within your 3D modeling software. This is often a good solution, especially when creating animations, because it allows all of the steps to be rolled into one package. Nearly every 3D modeling package offers some method to generate environmental fog—even Google SketchUp incorporates this effect. More advanced 3D modeling software usually has multiple methods for generating atmosphere or environmental fog. Typically, they can be categorized as simple fog and physical fog. The latter is generally more accurate, with better options to

control how the fog behaves with other elements in the environment; but normally, it takes much longer to calculate and render.

Typically, fog is generated as an environmental attribute and is enabled and controlled through two planes and the gradient between the two planes. In software such as Maya or 3ds Max, additional shaders or maps can be used to generate animated fog or to designate areas where fog is heavier than other areas.

A typical application of fog in 3ds Max involves adding fog in the **Render > Environment menu**. Once the fog has been added, two settings (Near and Far) control the amount of fog present in the environment. Both settings are a percentage, with 0 percent being no fog and 100 percent being completely opaque fog. Typically, the Near setting is set to 0–5 percent and the Far setting is set to 5–15 percent, creating a gradient of fog between the Near and Far. It is also possible to set a color for the environmental fog, as well as adjust settings for Noise and Phase in order to animate the fog.

Figure 27.18. Environmental fog.

Understanding Level of Detail

Level of detail, often referred to as LoD, is the use of more detailed models in the foreground and less detailed models in the background or context. LoD algorithms come from a specific area of computer graphics that focuses on optimizing real-time graphics. It is important to understand how level of detail modeling (although not a specific technique) can make your workflow more efficient.

With traditional mediums, designers illustrated what was in the frame of the camera; but with digital media, it is possible to model and create portions of the model that are outside our frame of view. Understanding the concept of LoD allows us to concentrate on elements of the model or environment that will be seen by the viewer while also adding detail to only the foreground models or elements, allowing the rest of the model to have fewer details. Not only does this follow the principles of atmospheric perspective, it also creates more efficient illustrations.

There are many ways to generate atmospheric perspective when representing the landscape with digital tools. Any singular or combinatory effect can be used to alter the four attributes affected by atmospheric perspective: detail, color, contrast, and brightness. Understanding how to alter these attributes allows us to develop techniques that are purely two-dimensional, hybrid 2D/3D, or purely three-dimensional.

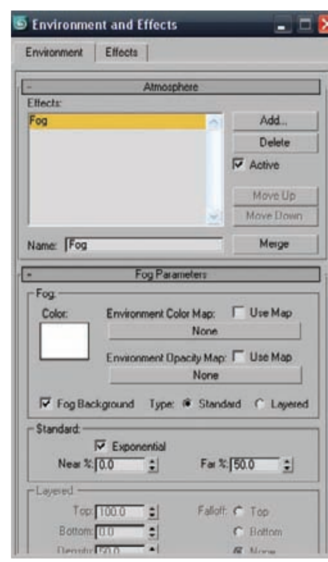


Figure 27.19. Environmental fog in 3ds Max.

Chapter 28
Camera Match 3D Object to Site Photo

The term *camera matching* traditionally refers to the process of aligning a virtual view or scene with a photograph or film sequence. Many different techniques exist for camera matching and, therefore, many terms exist for both still imagery and film sequences. *Match moving* is the process of tracking a sequence of images and aligning a virtual camera with camera view in the sequence. This alignment allows virtual elements to be composited with the live action in a shot that may have complex camera movements. This technique is similar to camera matching for still shots, but it uses the change in tracking points to determine camera positions. Rather than matching a site model to a photo, *photogrammetry* is a term that refers to the process of extracting three-dimensional information from two-dimensional photographs.

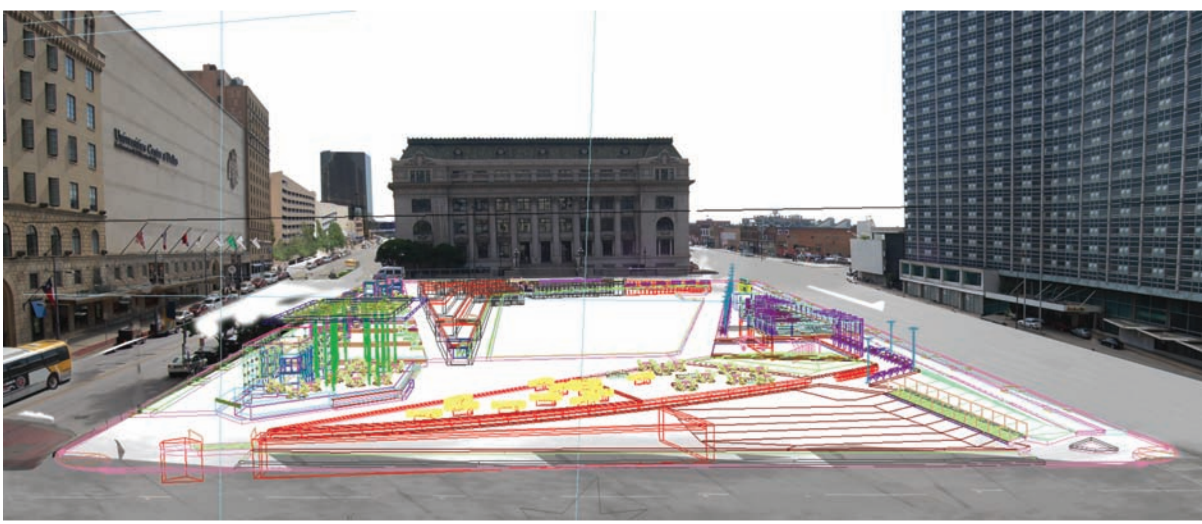


Figure 28.1. Wireframe model over photo.

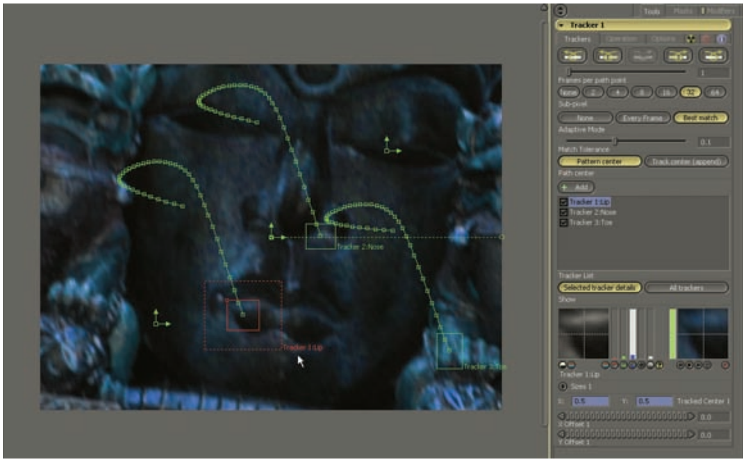


Figure 28.2. Match moving.

A camera match requires a series of points that can be "matched" between the existing photograph and virtual model. Most camera matching occurs through this method and requires two dimensions and typically five or more match points. The five points should exist with four points on one plane or dimension and another point on the second dimension. This will provide the software sufficient information to correctly calculate the desired view.

Figure 28.3. Planes with identified reference points.

A successful camera match allows for many possibilities in design representation. The most common use is to create reference models that can be rendered and used as layers in Photoshop. These layers provide a structure to collage additional textures and entourage.

We will examine two methods for camera alignment used to create a camera match. The first method uses CamPoints in 3ds Max Design 2009, and the second method uses perspective grid alignment in SketchUp.

Camera Match with 3ds Max 2009

Camera matching in 3ds Max requires a minimum of five points dispersed across two dimensions. For a successful match to be created, the distances between each point need to be known. The distance can be determined through site measurements or by using known points on a CAD survey. 3ds Max also requires synchronization between the rendering resolution, viewport background, and the resolution of the photo used for the camera match. This can be achieved by setting the rendering resolution in render setup to the same resolution as your photo.

1. To import the photo into 3ds Max, press Alt+B or select **Views > Viewport Background**.

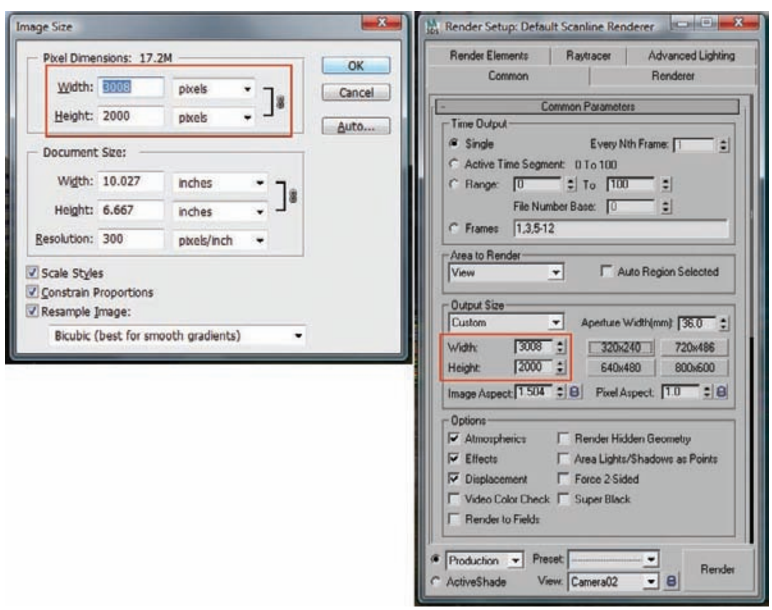


Figure 28.4. Rendering resolution in 3ds Max and Image Resolution in Photoshop.

2. Click the File button, and browse to the file location in the window. A wide range of image and movie formats are supported. 3ds Max allows more complicated matches using a video segment, allowing live action footage to be matched, or using an animated sequence as background footage.
3. Once the photo is imported, select Display Background and Lock Zoom Pan. Under Aspect Ratio, select Match Bitmap.

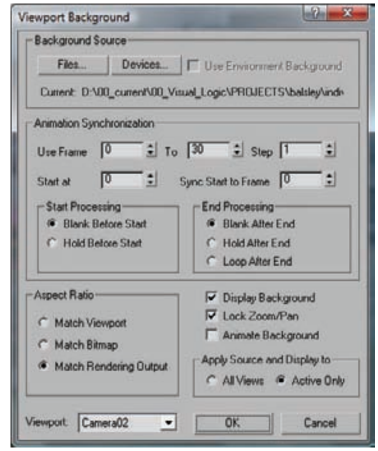


Figure 28.5. The Viewport Background dialog box in 3ds Max.

The image will be displayed in the active viewport. The rendering of 3ds Max viewports is dependent on the performance of your computer's video card. You can adjust the display resolution of the background image by **selecting customize->preferences, and clicking the viewport tab and choosing "configure driver."** You can select to have the graphics card match the resolution, which can lead to computer slowdowns for large images, or choose up to 1,024 pixels. For camera matching, using a higher resolution is useful for viewing the details in the background image.

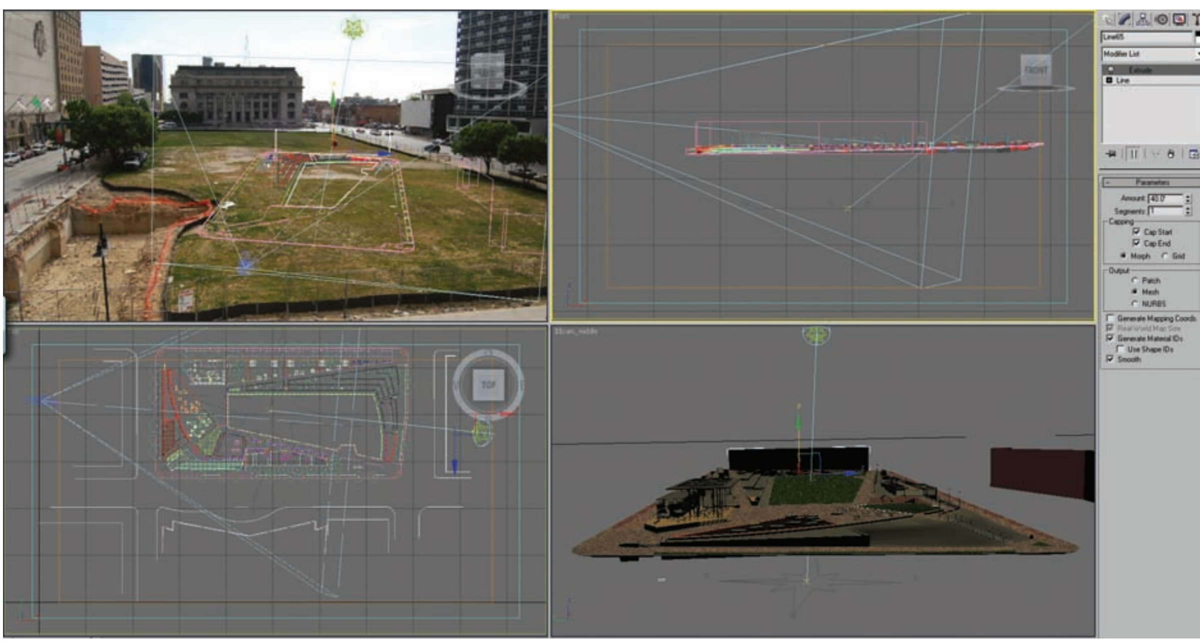


Figure 28.6. Model will be aligned to the imported image.

In order to match the scene to the background image, CamPoints need to be created. These *CamPoints* are placed in the environment and can be referenced to points on the image. In order to use the CamPoints, geometry must be created in the 3D environment with the correct dimensions to match elements in the photograph. It is also

possible to simply use coordinates, if they are known, rather than actual geometry. CamPoints should represent real-world positions that correspond to the image being displayed—otherwise, the camera match will not be able to resolve itself.

1. To create a CamPoint, use the Create panel, select Helpers, select Camera Match from the drop-down menu, and then click the CamPoint button. You can snap the CamPoint to geometry using 3D snaps, or you can place the CamPoint and reposition it with the Transform type-in dialog.

Figure 28.7. Model in relation to the image. Alignment points will be based on surrounding context.

2. Place each CamPoint at the correct location within the model until a minimum of five CamPoints are positioned within two dimensions.

Figure 28.8. Camera match markers are placed on modeled geometry.

3. After the CamPoints are positioned, a relationship needs to be established between each CamPoint and a position on the background image. On the Command panel, select the Utilities tab and then choose Camera Match, which will open the Camera Match dialog box within the Command panel.
4. This dialog box will have a list of the currently created CamPoints. Highlight the first CamPoint in the list and then click the Assign Position button.
5. Using your cursor, select the position on the photograph to which the current CamPoint belongs—or enter two-dimensional coordinates to place or adjust the CamPoint.
6. Repeat this process for each of the five (or more) CamPoints in order to create a relationship in the 3D environment with the image.

Figure 28.9. Camera match markers are associated with areas of the image.

Figure 28.10. Camera view derived from camera match.

After assigning a position on the image to each CamPoint, click the Create Camera button. Your new camera will align itself with the image based on the position of the CamPoints. If you need to make adjustments to the camera, you can select a CamPoint in the list, make the adjustments, and then press the Modify Camera button.

After a successful camera match is created, it is usually prudent to lock the camera to preserve its position. It is very easy to accidentally move the camera with an errant selection or by navigating in the camera viewport.

Match Photo with Google SketchUp

Google SketchUp 6 introduces a utility called Match Photo that facilitates the synchronization of a background photo with the 3D environment. SketchUp's method of synchronization is based on the perspective grid and requires an origin point, horizon line, and four vanishing point lines—two on the x-axis and two on the y-axis. For each of the vanishing point lines, it is desirable to use distances that exist across the image and exist perpendicular to one another (*x* and *y*). In order to scale the model correctly, it is also necessary to have a known dimension on the image. In order to provide an accurate scale, it is best to use a dimension that is as long as possible—so rather than using the height of a curb edge, it would be better to use the width of a street or plaza.

Figure 28.11. Image with defined vanishing points.

Figure 28.12. The Match Photo palette and the Create New Matched Photo button.

1. To access the Match Photo features, use **Window > Match Photo** to bring up the Match Photo palette.
2. The first step is to create a new Match Photo by pressing the Create New Matched Photo button in the upper-left corner of the palette. Browse to the location of the photo and select the file. Google SketchUp allows JPEG, TIFF, Targa, BMP, and PNG files to be used for a Match Photo.
3. This will create a new scene titled with the file's name. If you navigate away from your Match Photo, you can always click the Scene button at the top of the window to navigate back.

After creating the new Match Photo, the view will show an origin (yellow box), a horizon line (yellow line), two red vanishing point lines, and two green vanishing point lines.

1. The first step is to reposition the origin to define 0,0 on the photo. This can be accomplished by clicking and dragging the origin point and moving it to the desired location. The location of the origin is important because this will be where you start modeling in the newly matched photo.
2. When working in the Match Photo, it is possible to pan and zoom. It is important to zoom in order to accurately position each reference point, because small inaccuracies will be magnified across the Match Photo.

Figure 28.13. Reference points placed over background image.

3. After moving the origin point, you can begin aligning each of vanishing points in the x- and y-axes. Ideally, an object or landscape element that has two known perpendicular sides will be used as reference axes. Click and drag each endpoint to align the virtual vanishing points with the vanishing points on the image. The grid

may look wrong until you have all four vanishing points aligned. Remember to use your pan and zoom in order to make the alignment as accurate as possible. When all four vanishing point axes are aligned, click and drag the horizon line until it is aligned with the horizon in the image.

4. When you are done placing the reference points, right-click in the viewport and select Done.

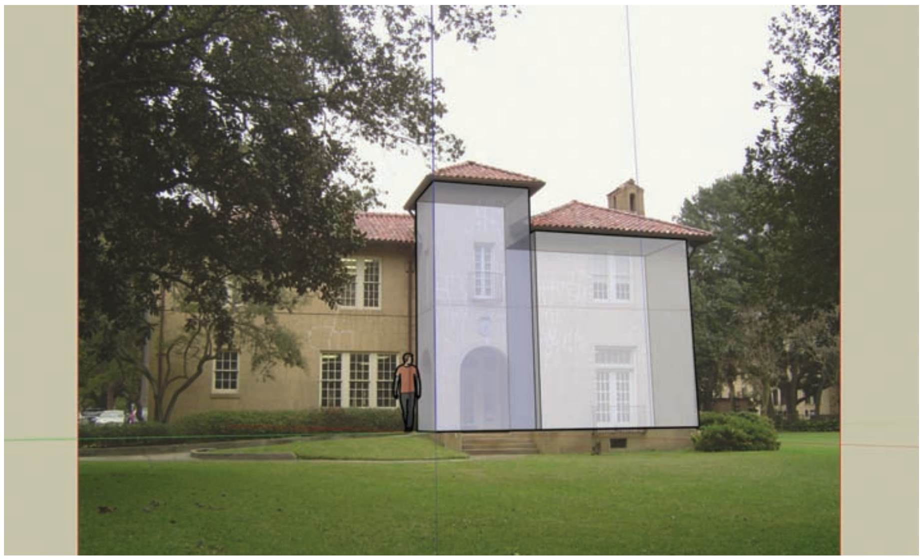


Figure 28.14. Aligned match photo with geometry.

Figure 28.15. Aligned match photo with Geometry.

If you need to make adjustments, you can edit the photo match and refine the placement of the vanishing points. The Match Photo also provides options to adjust the opacity of the photo as well as change the display style of the grid and planes that define the perspective. It is also possible to generate textures from the Photo Match, which can be useful when creating context geometry for models.

Chapter 29
Create a Photoshop Perspective Collage

Some perspective images can be created completely from Photoshop images without using any 3D modeling program as a base. Often these images are similar to *ideograms* or are experimental images used to show programming ideas or material relationships. Perspective images created from scratch within Photoshop can be incredibly evocative images using multiple layers and transparencies.

The source material for perspectives is usually created from images of the site itself or existing entourage from other projects. The technique should be fluid and quick, especially at the beginning of the drawing until the final layout is determined. The first part of the drawing should be done with this in mind and an eye toward finding good combinations of different images, compositions, and overall tone of the image. It is rare that drawings like these start off with a predefined idea of exactly what the finished image will look like. Rather, the process is similar to sketching to find how the image might look and then refining that image once the groundwork has been laid.

Methods

These drawings typically start by creating the background, and then the general composition of the image is built up as the drawing progresses. Consider the following example to understand the anatomy of one of these perspectives:

1. The drawing starts with a section of the forest background. This section does not need to be finely drawn. Especially at the beginning, do not spend too much time trying to refine the drawing. The beauty of digital media is the ability to edit and rework a drawing over and over. Start by roughing out an overall idea of how the image will look, where the horizon line will be, where the vanishing points might go.

Figure 29.1. Start building the background with sections of an existing photograph. At this point in the drawing, speed is key. Do not spend too much time on any one image as the drawing is being built.

2. Add several more layers of images to build the background. This is the time to begin to figure out where the horizon line should be and experiment with the overall composition of the drawing.

Figure 29.2. Continue to build the background while experimenting with the overall composition of the image.

3. Continue to build the image until most of the background is established.

Figure 29.3. The background is built from a variety of elements.

4. The ground plane is built with several different types of small images. For this application, the edges of the ground plane images are roughed up using the Eraser tool. These small images are the building blocks of the entire forest floor.

Figure 29.4. The ground plane starts with several small elements that are copied around the drawing. This figure shows two of these elements.

5. Duplicate the building blocks to create the forest floor. Notice that the copies of the images are altered. On the left side of the image, the copy of the meadow grass has the saturation lowered. On the right side of the image, the copies of the image that are closer to the viewer are more saturated in color. This is how the illusion of depth is created in the drawing. As objects get farther away, they become less saturated, lighter, and bluer. As these images are copied, each copy should be altered to reflect its spatial position in the image.

Figure 29.5. As the elements are copied, the saturation and lightness of the images area altered. As the ground plane moves away from the viewer, it becomes less saturated. The images also become smaller.

6. More of the ground plane is built up. It is important to establish the mid-ground elements in the ground plane first. This allows all of the images that are closer or farther away to be either less or more saturated than the mid-range elements. It also helps hold the drawing in place by creating a mid-ground plane that is different from the foreground or background.
7. Other ground plane elements can be added to create the base. Continue to copy these elements around the ground plane, changing the size and saturation of each image.
8. Fill in any missing areas of the image until the basic composition is established.

Figure 29.6. Creating the mid-ground is important. This should be established first. It helps give a texture reference for creating the foreground and background. The scale of the foreground and background (i.e., the size of the little images used to create the ground plane) should be relative to this mid-ground image.

Figure 29.7. Additional ground plane elements can be added to the drawing.

Figure 29.8. Continue to build the ground plane.

Figure 29.9. Ground plane and background are complete.

9. Begin to add foreground elements to the drawing. These elements typically come from the entourage collection. The foreground elements should be darker and more saturated than the background.

Figure 29.10. Add foreground elements. These elements should be more saturated and less transparent than the background images.

10. Continue to add foreground elements to the drawing. The foreground elements that are farther away are usually made to be more transparent and less saturated, similar to the ground plane textures.

11. The pathway is created from a standard section of pathway from a photograph.

Figure 29.11. Continue to fill in with foreground images. The farther away the image, the less saturated and more transparent it becomes.

Figure 29.12. Source image for pathway.

12. The pathway image is copied into the rendering.

13. The pathway needs to be altered to fit the drawing. Select **Edit > Transform > Distort**, and use the Distort tool to change the shape of the pathway.

Figure 29.13. Copy the image into the drawing.

Figure 29.14. Use the Distort tool to alter the shape of the pathway.

14. Copy the image and use the Distort tool to place it at the end of the first image. Do this a few more times to build the basis for the path. Once a base for the path has been built, merge the layers.

Figure 29.15. Copy the image to build the pathway.

Figure 29.16. Continue to build a base for the path. Once the base has been built, merge the layers.

15. Select and erase any part of the image that does not line up.

Figure 29.17. Select one side of the path.

Figure 29.18. Erase any areas on the path that are not lined up.

16. Adjust the path to create the base path. In this example, copy any parts of the path that need to be altered.

Figure 29.19. To copy the white border to the other side of the path, select the border using the Lasso tool.

Figure 29.20. Using the Move tool, hold Alt and drag the selection. This will make a copy of the white border.

Figure 29.21. Select **Edit> Transform> Distort**, and use the Distort function to bend the shape to fit the other side of the path. Erase any areas outside the white border with the Eraser tool.

17. Move the combined pathway to the correct area in the composition. Copy and alter the path to set the correct orientation.

Figure 29.22. Move the path to the proper place in the composition.

Figure 29.23. Copy and alter the shape of the path to set it in place.

18. Use the Hue/Saturation adjustment to alter the color of the pathway to fit the composition.

Figure 29.24. Adjust the color and transparency to finalize the place of the path in the composition.

19. Add people, wildflowers, and shadows to create the final image. The text on the pathway is created by using the Text tool to write the words. Their position is adjusted using the Distort tool in a similar way to the methods used to compose the path.

Figure 29.25. Add people and other details to create the final image.

Chapter 30
Developing a Perspective Image in Photoshop from a 3D Model

Creating a perspective rendering with a 3D model as a base is a common method of illustration. The 3D model serves as the perspective grid, creating a reference to add context, texturing, vegetation, and entourage. This technique was originally used for analog renderings; a composition was created and the view was exported to be traced and rendered using pen, graphite, and/or colored pencil. This is the basic technique that will be followed here, except the rendering will be accomplished digitally.

Base Model

The view for the base model will be either rendered or exported from a 3D modeling application such as 3ds Max or SketchUp. Both applications have two different options for exporting, and it is worthwhile to quickly touch on them. In 3ds Max, an image can be rendered with an *alpha mask.* This mask will create an image with *only* the pixels that represent the model and the rest of the image will be transparent. In order to use this alpha mask, the model view must be rendered and then saved as either a TIFF or PSD file with the alpha mask enabled. This is typically an option when saving the file. The resulting image will have a channel called alpha that can be used to select the pixels or to invert the selection and delete the background if it is not already transparent.

If the view will be exported from SketchUp, an alpha channel is not an option. The best option is to create a style that maximizes the contrast between the model surfaces and the background. This will create an image where the background can be selected in Photoshop using the Color Range selection or Magic Wand tool. The default "engineering" style in SketchUp will provide crisp linework, and a completely white background and ground plane, making selections very simple with the Magic Wand tool.

The image that will be used for the following example was generated from a model in 3ds Max; the background is transparent. For more information on making selections, see Chapter 8. For more information on creating camera compositions, see Chapter 26.

1. The first step is to create a series of reference lines over the base image. Create a new layer group and name it construction. Make the layer group active.

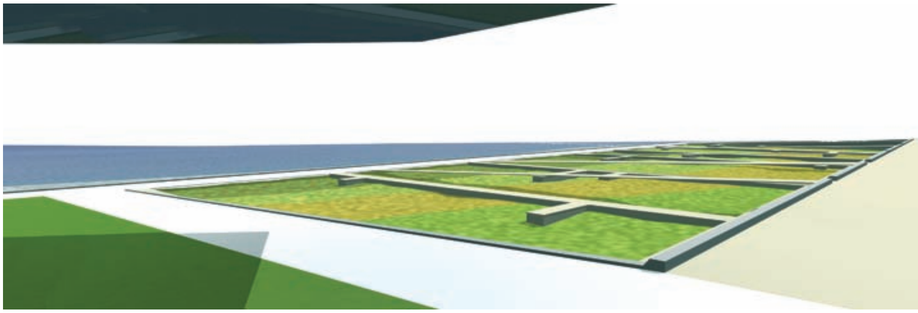


Figure 30.1. The base model is rendered and used as the framework for the Photoshop rendering.

2. Select a bright garish color; for this example, hot pink will work. Select the Line tool and begin tracing the site infrastructure back toward the vanishing points.
3. Trace the major elements such as the water edge, pathways, vertical elements, etc. This will serve as the framework as content is added to the rendering.
4. Flatten the group by selecting it and merge the group (Ctrl+E).

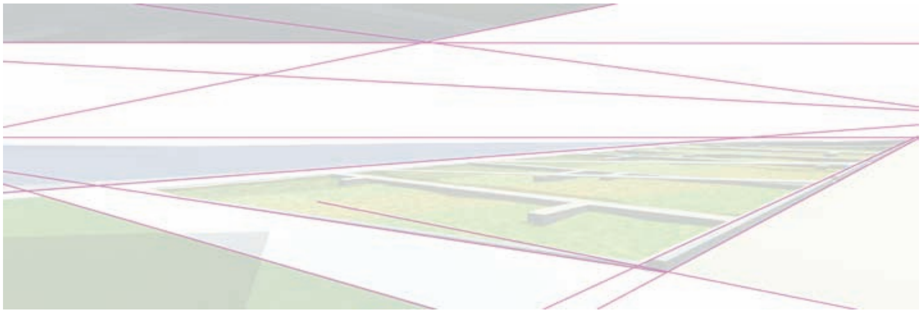


Figure 30.2. Rough construction lines are created to reinforce the vanishing points established by the model.

Adding Site Context

In most cases, the digital model will have been a study, used to determine scale and massing—and it requires Photoshop to create an experiential image that evokes the designer's sense of place. Creating that sense of place should start with the site context. A perspective view needs to have *context,* a site where the design resides. When composing views for a rendering, consider what aspects of the context will be visible. If they are identifiable monuments, they should be incorporated. This will create an identifiable marker in the landscape that will orient the viewer.

The first step will be to determine which parts of the existing site photos to use when creating the context. The following two photographs contain the elements needed to create the context; one has a good view of the railway bridge and the second has a

strongly defined water's edge. In order to use the images, it will be necessary to select out the bridge and water's edge from the original source imagery. This can be accomplished using two different methods. The first of which will be used to capture the water's edge.

Figure 30.3. The source imagery that will be used to create the context.

1. Using the Lasso tool, simply trace a rough selection around the area of the water's edge that needs to be selected. The tracing does not need to be accurate; it merely needs to encompass the area to be extracted.

Figure 30.4. Select the edge that will be used in the rendering.

2. Copy the selected area using Cmd/Ctrl+C (or select **Edit > Copy**) and switch back to the model base image and paste the water's edge into the image. Create a new layer group, name it far context, and drop the pasted artwork into the group.
3. Position the artwork into the area where it will be used, in this instance the artwork is warped. Use the Free Transform tool (Cmd/Ctrl+T) and then right-click within the bounding box on the canvas and choose Warp. Adjust the edges and rectangles of the warp to straighten the image. Press Enter or double-click within the bounding box when done.

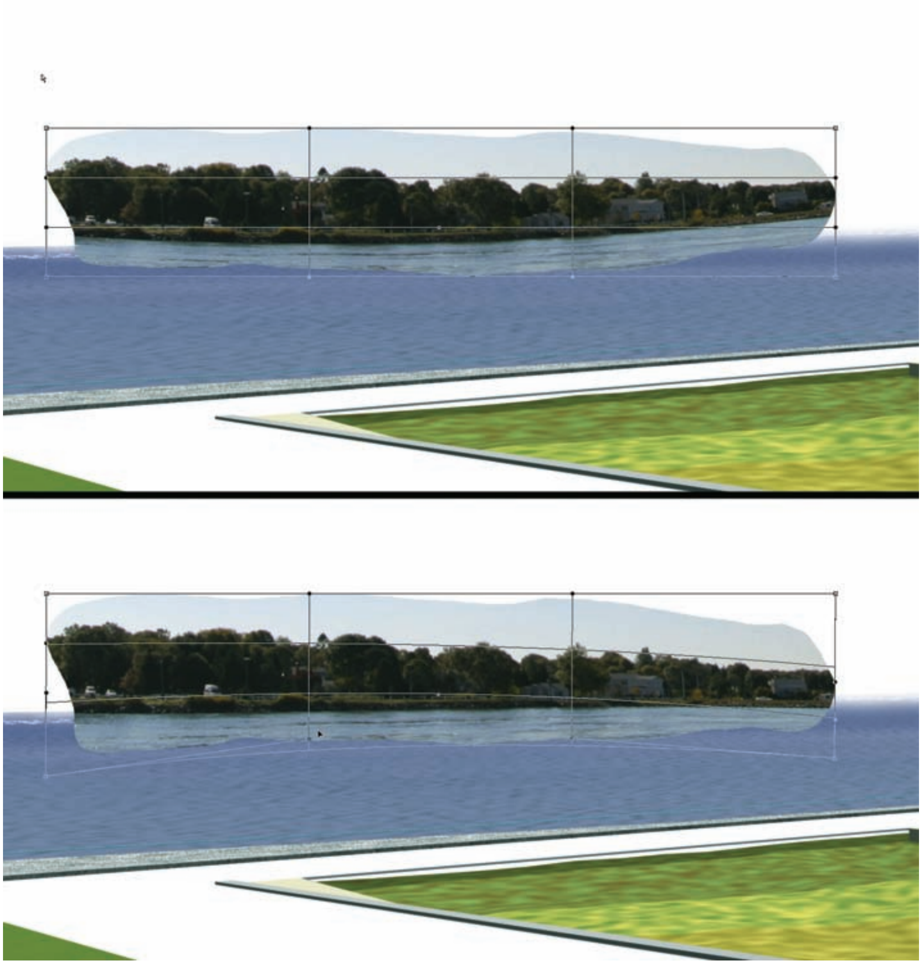


Figure 30.5. Transforming the edge with the Warp tool.

4. Position the image and use the Free Transform tool (Cmd/Ctrl +T) to scale the image into the location. Using the Warp, Skew, and Perspective transforms, finish transforming the image.

5. It is easier to delete the background from the context artwork now as opposed to doing it in the source image. This can be done using the Magic Wand tool to select the sky and then deleting it using the Eraser tool to remove a portion of the water. If a soft edge is used to delete the water, it will blend better into the water from the model.

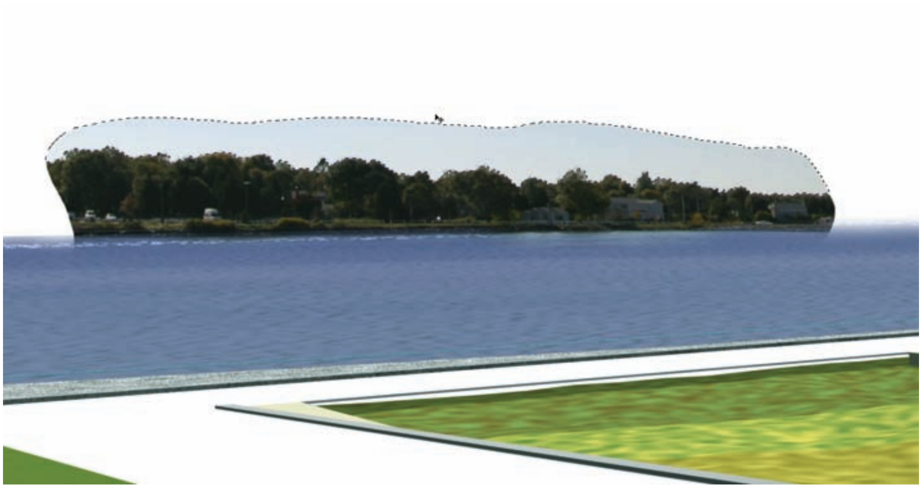


Figure 30.6. Select the sky with the Magic Wand and delete.

The second image is the bridge that must be extracted from the blue sky. This can be accomplished using Select by Color Range.

1. Before using Select by Color Range, convert the background layer of the source image to a normal layer, double-click on the layer, and then click OK when the dialog box appears.
2. Using the Crop tool (C), crop the image down to the edges of the bridge. Leave a small amount of room, 5 to 10 pixels.
3. Instead of selecting the bridge directly, it will be easier to select the sky because it has a continuous and similar range of colors. Selecting the bridge would require increasing the color range across several colors, creating a selection with excess selections across the image. Go to **Select > Color Range**. In the dialog box, make sure that Select is set to Sampled Colors, Fuzziness is around 30–40, and that the radio button for Selection is activated. The color range to be selected will be colors that are sampled from the image. The Eyedropper is used to specify the colors to be selected. The Fuzziness controls how far beyond the selected color range the selection will go. The Selection radio button simply creates a preview in the window of what the selection will be, rather than a preview of the image.

Figure 30.7. Crop the source image to the edges of the bridge before selecting.

4. To make the selection, use the Eyedropper to select a blue in the sky. The selection preview will appear in the window. Hold down the Ctrl or Cmd key and select another blue in the sky; this will add to the selection. Continue selecting blue pixels until the entire sky is selected in the preview window. Press OK to apply the selection.

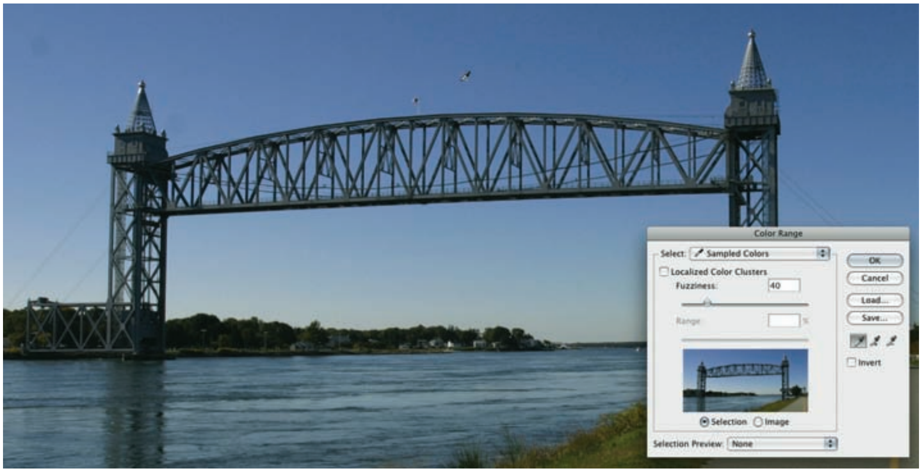


Figure 30.8. In the Color Range dialog box, the Eyedropper will sample color values for the selection.

5. The sky is now selected. If selected areas need to be kept, those areas can be deselected using the Selection tools. Because the layer is not a background layer, the pixels can simply be deleted. If there are more areas to select, Select Color Range can be used again.

Figure 30.9. The sky is selected for deletion.

6. After everything has been deleted, drag the layer into the base image and use the Transform tools to align the context image.

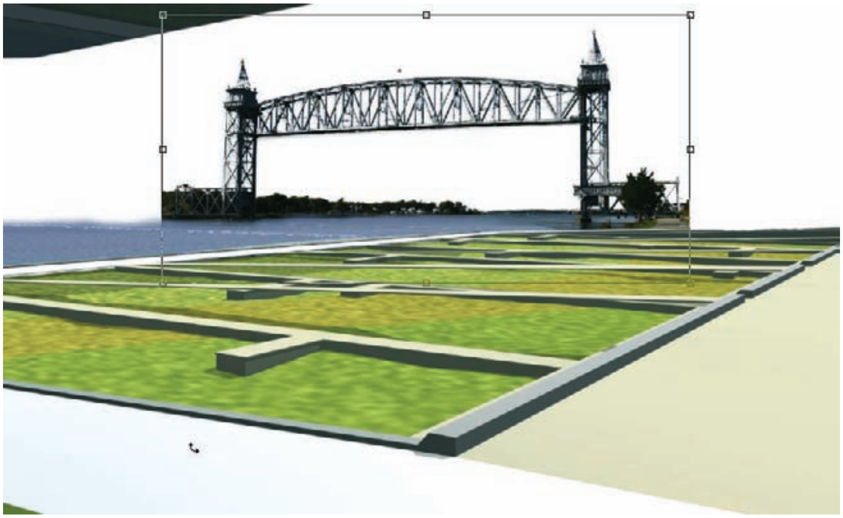


Figure 30.10. The bridge is placed into the rendering and transformed.

The last step is to add the sky, blend the context, and organize the context layers.

1. Create a new layer group and pull it below the model base. Place both context layers into this new context folder.
2. Create a new layer and call it sky. Switch to the Gradient tool and make sure it is set to a linear gradient. Change the foreground color to white, and then switch the foreground and background by pressing X. Double-click the new foreground swatch and use the Eyedropper to select a blue from the water. The color of water is usually just a reflection of the sky and, therefore, it will look right if the blue comes from the water.
3. Make the sky layer active. Using the Gradient tool, drag from the top of the image down to the bottom while holding down the Shift key; this will keep the gradient straight. This will create a gradient that goes from blue (foreground color) to white (background color). The white should be on the horizon line, and it should then go up to the blue sky.

Figure 30.11. Using the settings for the Gradient tool, the blue is sampled from the water.

4. Select the other context layers (the bridge and water's edge) and adjust the opacity to approximately 70 percent. This will blend the context layers with the sky.

The context will instantly ground the image in a recognizable landscape. This provides a sense of scale and orientation for the model base.

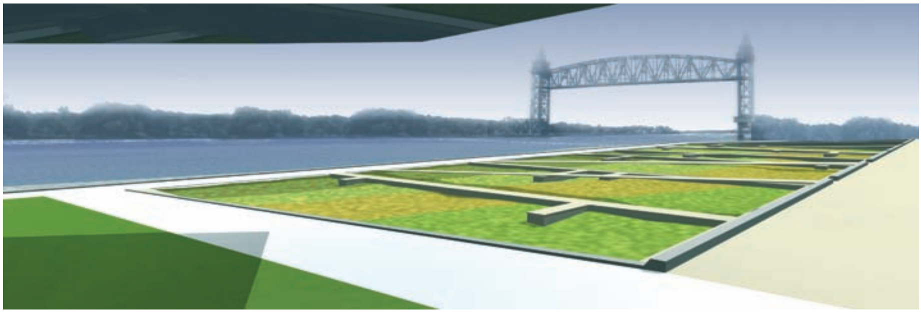


Figure 30.12. Using the settings for the Gradient tool, the blue is sampled from the water.

Textures

The next steps will be to add texture to the model using source imagery. The wetland area near the front of the image needs to have texture added.

1. The source image is a view of a marsh area from an elevated perspective. In order to use the image, simply drag it into the perspective rendering and align the bottom edge with the bottom of the wetland area.

Figure 30.13. The wetland texture image is placed in the rendering and aligned.

2. Using the Free Transform tool (Cmd/Ctrl+T), scale the image down so that the perspective changes. Press Enter after the image has been transformed to set the transformation. Rename the current layer to wetland texture and then turn off the layer.

Figure 30.14. The image is scaled down vertically to change the perspective and to fit within the space.

3. Using the Polygon Lasso, make sure the feather is set to 0. Trace around the edge of the wetland area, and zoom in if necessary. As the cursor gets near the edge of the canvas, it will scroll. If a mistake is made, use the Backspace or Delete key to undo one step.

Figure 30.15. The Polygon Lasso is used to select around the edges.

4. Turn the wetland texture layer back on, and make it active. Then create a layer mask. It will use the current selection to mask the image. Adjust the layer opacity on the image to blend it with the model below.
5. The color of the texture can be adjusted by adding a hue and saturation adjustment layer above the wetland texture layer. Adjust the color; this will affect all of the layers below the wetland texture layer. Hold down the Alt key and hover the cursor over the area between the adjustment layer and the wetland texture layer in the Layers palette. When the Clip icon appears, click the mouse button. This will apply the adjustment only to the pixels on the wetland texture layer.

Figure 30.16. A layer mask crops the image, and an adjustment layer is clipped to the image in order to change the hue/saturation.

Because masks and adjustment layers are being used, it is possible to reposition the texture or adjust the color at any point during the rendering process.

Adding Vegetation

This example will highlight how to add two types of vegetation to the perspective. Grasses in the wetland area will be added first, and then trees will be added as smart objects to the walkway near the water's edge.

1. For grasses to added to the wetland area, a source image that contains the grasses is needed. The following image will work for this rendering. The grass edges and background are much too complicated to cut out by hand. Not only would it take many hours to accomplish, but it would never look convincing. In this case, just use the Polygon Lasso tool (L), select a portion of the grasses to be used in the rendering, and copy them (Cmd/Ctr+C).
2. Create a layer group at the top of the layer stack in the perspective rendering, and paste the grasses into the group. Select the layer and make it active.

Figure 30.17. Quickly select a portion of the grass area to be used within the rendering.

3. Use the Move tool (V) to position the grasses. Using the Free Transform tool (Cmd/Ctrl+T), scale, skew, and transform the grasses within the wetland area until they match the perspective.

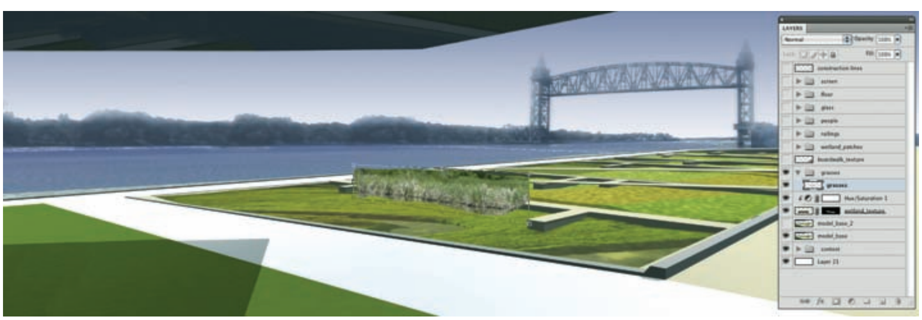


Figure 30.18. Use the Scale, Skew, and Perspective transforms to adjust the image.

4. Instead of selecting the background away from the grasses, it is much faster to use a brush tip with custom settings to erase away the edge. In this instance, the Grass Brush tip shape (rotated upside down, and with scatter dynamics applied) will create a perfect eraser to create the top edge of the grasses. If possible, it is better to use brushes to create complex edges when Color Range or the Magic Wand can't be used.

Figure 30.19. A dynamic brush can be used to erase the top edge of the grasses.

5. Rename the layer to grass texture and adjust the opacity to approximately 75 to 80 percent. This will blend the grasses with the rendering. Create a new layer group, put the grass texture in it, and copy the grasses around the wetland area using the Move tool while holding down the Alt key. Use the Eraser brush previously created to alter each of the grasses so that they are not identical.

Figure 30.20. The grass image is copied and transformed throughout the desired area.

6. When adding collage elements, such as the grass, shading needs to be added to ground the element into the rendering. Create a new layer and place it under the grass texture layer. Switch to the Brush tool and choose a soft brush. Hold down the Alt key; this will switch to Eyedropper. Pick a dark color near the base of the grasses. Go into the color swatch and make the color much darker.
7. Paint around the base of the grasses on the new layer. The color will be much darker than needed. Switch the layer screening mode to Multiply, and adjust the opacity to 15 to 35 percent. This shading provides shadows at the base of the grasses and grounds the image in the rendering.

Figure 30.21. Shading is applied to the base of the grasses to create shadow.

This method can be used to add any collage element that has random edges. The shading helps to solve the cut-and-paste effect that occurs when combining elements from different images. For some images, it may also be necessary to use adjustments such as Hue and Saturation, or Brightness and Contrast, to blend the images with the rendering.

The next step will be to add trees using smart objects. The trees will be added using an existing entourage file.

1. Drag the tree into the rendering and rename the layer to park tree. Right-click on the layer and choose Convert to Smart Object. Place the smart object into a new layer group called trees.
2. Position the tree within the rendering. Go into Free Fransform mode (Cmd/Ctrl+T). Move the origin point to the base of the tree. While holding down Alt+Shift, scale the tree to the correct size. Shift will keep the scaling proportional, and Alt will scale the image around the origin point, which is at the bottom of the tree image.

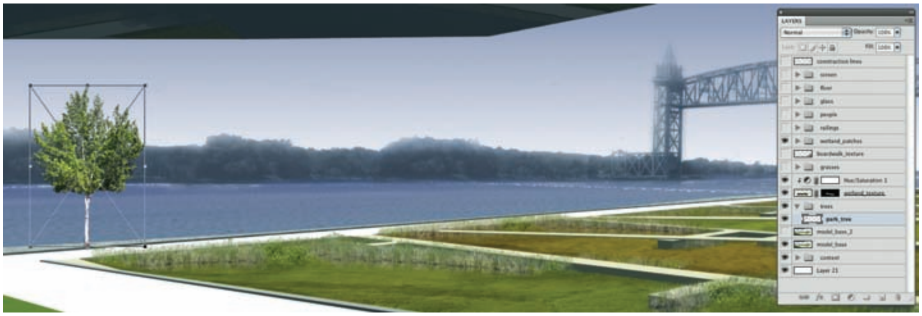


Figure 30.22. The tree image is inserted, positioned, and scaled.

3. Copy and scale the tree images into position within the rendering. Reorder the layers so that trees in the background are behind trees in the foreground.

4. Adjust the layer opacity of the trees. The trees in the foreground should be at 95 percent opacity, and the trees in the background should be at approximately 60 percent. The trees in the middleground should have an opacity that is somewhere between 60 and 90 percent.

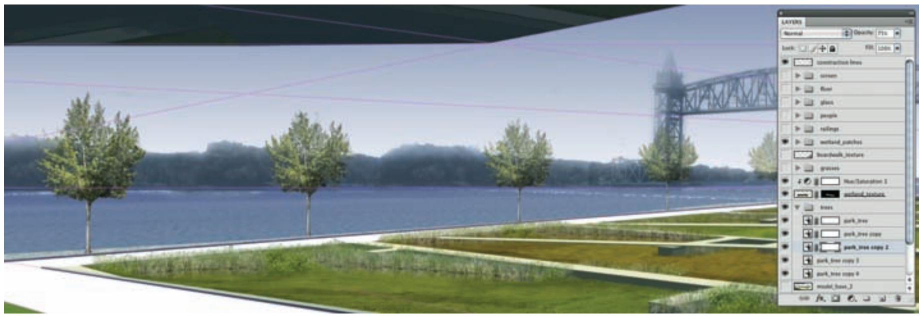


Figure 30.23. The trees are copied and adjusted to blend within the perspective.

Adding Scale Figures

Scale figures help define the spatial quality of a rendering. Figures can also convey the program of a given space. Whenever possible, use the activity of figures to illustrate what people may experience in spaces. The scale figures will be added using an existing entourage file.

1. Drag the layer into the rendering and rename the layer to people standing. Create a new layer group entitled entourage and place the layer in the group. Transform and position the file within the rendering using the Transform tools.
2. Depending on the rendering style, the entourage can be rendered as black and white. Simply go to **Image > Adjust > Black and White**.
3. To add a shadow for the people, create a new layer under the People Standing layer. Hold down Ctrl and click the People Standing Layer thumbnail to select the pixels on that layer.

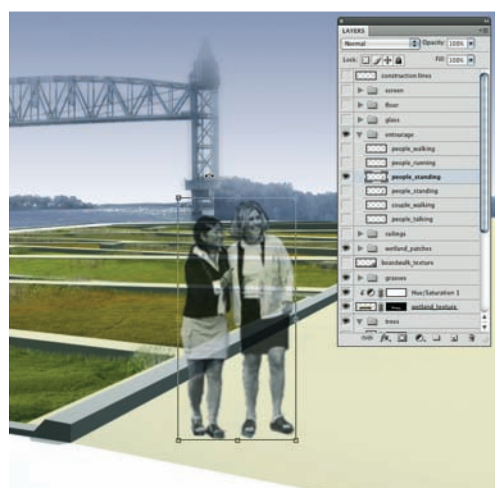


Figure 30.24. The scale figures are inserted and transformed.

Make the new layer active, and fill the selection with black. This will create a black silhouette of the people. For some renderings, silhouettes can be used instead of the actual images of the people.

4. In this case, free transform (Cmd/Ctrl+T) the silhouette, right-click, and flip it vertically. Position the silhouette at the base of the people and scale it vertically. Skew the shadow in the direction of the light.
5. Rename the silhouette layer to people standing shadow. Adjust the opacity to 50 percent and change the screening mode to Multiply. Adjust the People Standing layer to approximately 80 percent. This will blend the shadow and the entourage with the rendering.

Figure 30.25. The figures are selected, and a new layer is filled with black to create a silhouette.

The same techniques described previously can be used to finish the texturing, add vegetation, and create depth in the final rendering. It is important to realize that it is not always necessary to create complex selections in order to add complex imagery to a rendering. If possible, use Photoshop's brush dynamics to create complex edges. It is also important to use adjustments and opacity to blend the elements with the illustration.

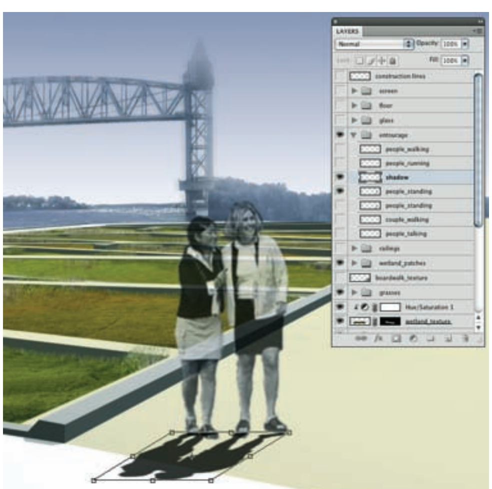


Figure 30.26. The silhouette is flipped vertically, scaled, and skewed to create a shadow that aligns with light cast in the perspective.

Figure 30.27. The figures are blended with the perspective by lowering the opacity.

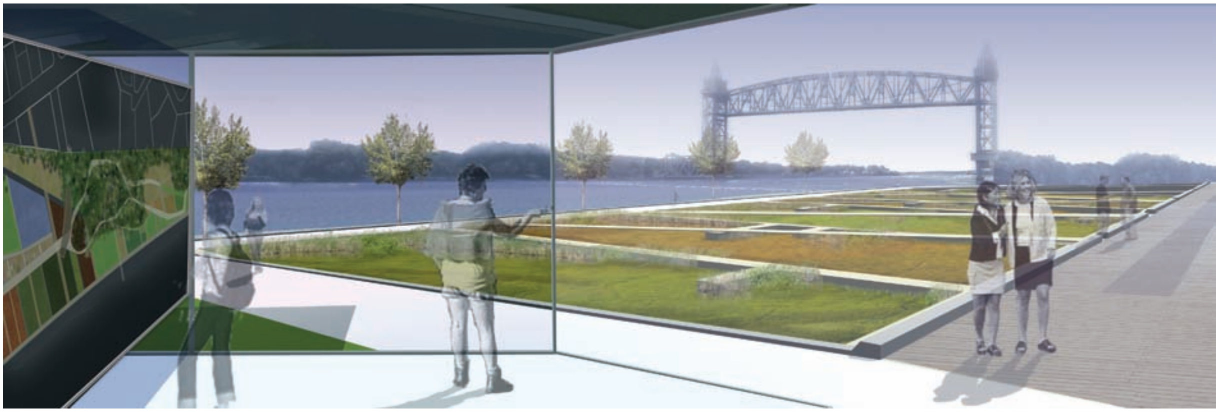


Figure 30.28. The final rendering was created using a combination of the previously mentioned techniques.

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